Demographic Consequences of the Great Leap Forward in China's Provinces

Xizhe Peng

In November 1957, at a meeting of representatives of Communist and Workers' Parties in Moscow, the late Chairman Mao Zedong proposed the goal for China of overtaking Great Britain in industrial production within 15 years. The Chinese Communist Party convened several important conferences in the early months of 1958.[1] A transformation of society was projected in which the masses were to be the driving force. The general line of the Party that guided the Great Leap Forward was "Going all out, aiming high and achieving greater, faster, better, and more economical results in building socialism."[2] Labor-intensive development was viewed as a solution to the problem of capital shortage; partial imbalances were to be taken in stride. Development processes were explained in political terms, and the impact of ideology on economic development was emphasized.

Launched in the spring of 1958, the Great Leap Forward was China's alternative to Soviet-style development, an attempt to leap ahead in production by reorganizing the peasantry into large-scale communes and mobilizing society to bring about technological revolution in agriculture.

As the Great Leap progressed, production targets were revised upward several times, reaching unrealistic levels. Heavy industry, especially steel production, was accorded high priority at the expense of agriculture and light industry. Residents in both urban and rural areas, young and old, were mobilized to increase iron and steel production. Millions of peasant laborers moved into cities to work in factories. In the countryside the formation of people's communes was praised as a "golden bridge" toward communist society.

Unfortunately, nothing worked as expected. The practice of claiming nonexistent achievements became a "wind of exaggeration" that blew through the country. The "communist wind," which referred to impracticable attempts to establish a "communist society" by means of equal distribution, emerged

as a striking feature of the Leap.[3] Much of the iron and steel that was made by backyard blast furnaces was useless. Foodgrain production declined considerably in three successive years, 1959–61, and industrial output fell subsequently. The standard of living also deteriorated sharply. The years 1959–61 are remembered as three bitter years in modern Chinese history. Faced with the collapse of the commune system, the leaders made extensive organizational changes, and in 1962 they decentralized the unit of labor management and income sharing to the small-scale production team.

The demographic consequences of the Leap and the communization movement were severe, particularly in the vast rural areas. It is not possible now, and probably never will be, to fully quantify the magnitude of the demographic crisis. Many efforts have been made, however, to estimate the severity of the crisis at the national level.[4] This article explores the patterns of demographic crisis at the provincial level. First, the demographic consequences of the Great Leap Forward—encompassing the years 1958–62—are examined by analyzing the massive fertility deficits and excess deaths that occurred during and immediately after the Leap. Second, food supply and consumption patterns during the period are described. Finally, an effort is made to identify the causes of the demographic crisis.

The Chinese mainland is administratively divided into 21 provinces, five autonomous regions, and three large municipalities. For the sake of simplicity, all locations will be referred to as provinces hereafter. The Tibet Autonomous Region (or Xizang) is excluded from the analysis because it was not included in the 1982 one-per-thousand fertility survey, which is our major source of demographic data.

Demographic consequences

Massive fertility fluctuation

The major measurement of fertility used in this analysis is the "incomplete total fertility rate," defined as the sum of age-specific fertility rates for all women up to and including age 39 years. In China's 1982 one-per-thousand fertility survey, the upper age limit of respondents was 67 years. Therefore, complete sets of fertility rates are available only for 1964 and subsequent years. An attempt to estimate total fertility by extrapolation, which might work under normal conditions, runs the risk of distortion. Using incomplete fertility rates avoids this risk.

Fertility was fairly high throughout China in the mid-1950s and remained so until the late 1960s with few exceptions (primarily the major cities). Any departure from the fertility patterns prevailing during the mid-1950s, then, may be regarded as resulting from the impact of the Great Leap. The average value of the incomplete total fertility rate in the mid-1950s (1954–57) is taken as a reference value. Because annual deviations of up to 10 percent were not unusual in the mid-1950s, any deviation exceeding 15 percent of the reference

value is regarded as significant. A period of fertility crisis is defined as any year in which incomplete total fertility was more than 15 percent below the average value of the mid-1950s. "Total fertility loss" is defined as the sum of those significant (i.e., more than 15 percent) annual percentage shortfalls during the years of crisis. Total fertility loss is thus expressed as a percentage of one year's total births to women aged 15–39 years under normal conditions. Fertility compensation can be estimated in a similar way. Finally, "net fertility loss," obtained by subtracting total fertility compensation from total fertility loss, is the net effect of the fertility crisis.

For China as a whole, total fertility up to age 39 was about 5.6 births per woman in pre-Leap years. It fell slightly in 1958 to 5.2 and declined sharply in the years 1959–61. In 1961 total fertility to age 39 dropped to its lowest level, 3.06, more than 45 percent below the pre-Leap level. But in 1962 a recovery set in, and in 1963 a peak value of 6.9 was reached, the highest level recorded since 1949. In 1964 fertility returned to levels prevailing in the precrisis period. The national figure for the total fertility loss during 1959–61 was about 109 percent, or more than a year's births under the mid-1950s fertility regime. On the assumption that the birth rate would have remained at its pre-Leap level without the crisis, births lost or postponed amounted to some 25 million during 1958–62.

Provincial patterns Provincial patterns of the timing and extent of fertility crisis are estimated in Table 1, where provinces are ranked in order of total fertility loss (col. 4). One can see from the table that the fertility crisis was countrywide and that a three-year period of crisis, from 1959–61, was common. The timing and severity of the crisis, however, varied greatly between provinces. Fertility crisis (i.e., incomplete total fertility more than 15 percent below the reference value) lasted four years in six out of 25 provinces but only two years in four other provinces. The crisis was briefest in Heilongjiang, where a significant deficit occurred only in 1961. So far as the magnitude of the crisis is concerned, the total fertility loss varied substantially by province, being least severe in Heilongjiang at 31 percent and most severe—approaching a deficit of about two normal years' total births to women aged 15–39 years—in Anhui. In more than half of all provinces the index of total fertility loss exceeded 100 percent, or the equivalent of one year's births under the mid-1950s fertility regime.

A striking feature of the data is the regional clustering of the severity of the fertility crisis (see Figure 1). Four groups of provinces are distinguished by their total fertility loss. The first group contains the most severely affected provinces, the fourth those least affected. The two most severely affected provinces were Anhui and Sichuan, where the index of total fertility loss exceeded 165 percent. The five adjacent provinces north of Anhui also suffered severely, as did the vast areas to the north and south of Sichuan. These 13 provinces in which the total fertility loss exceeded one normal year's total births are situated in the middle of China, from the east coast to the remote

TABLE 1 Fertility fluctuations in China, 1958–65

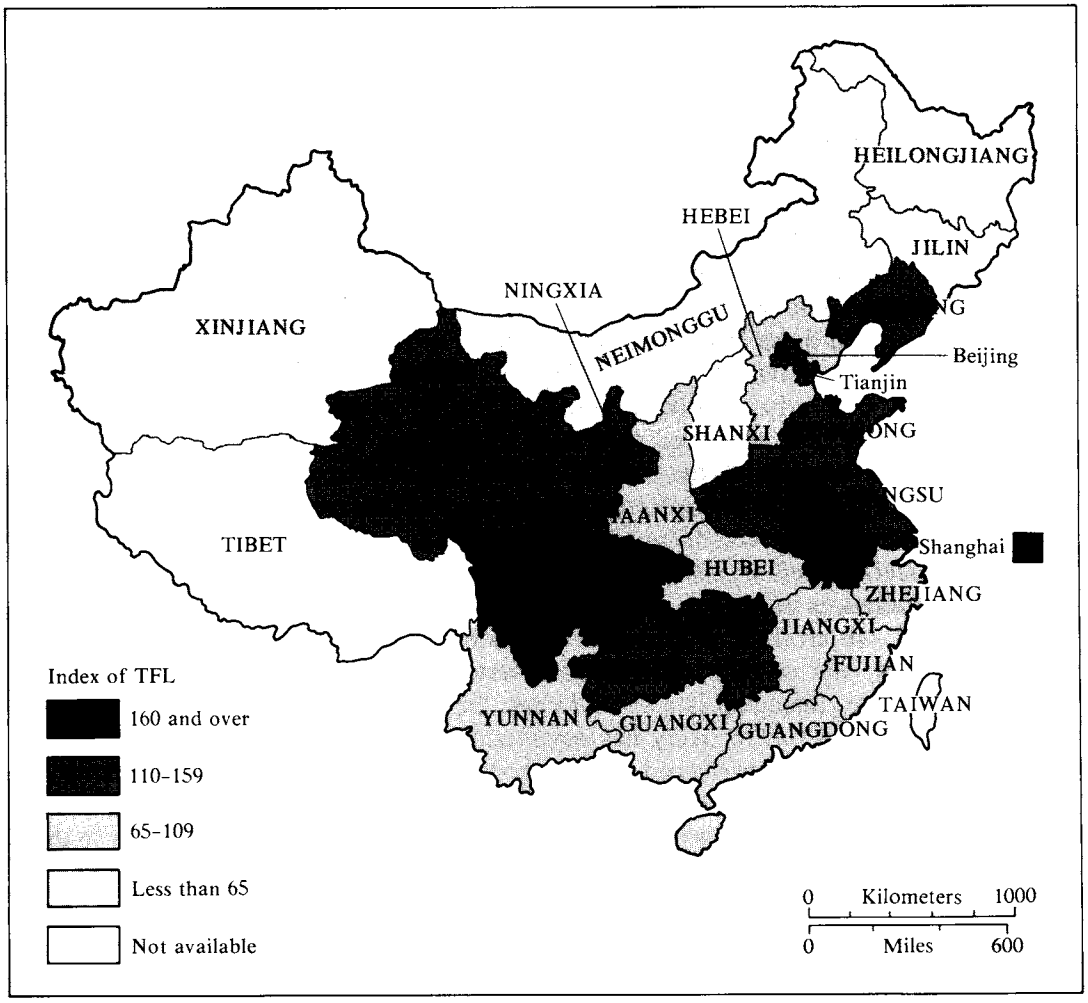
Province	Crisis period			Total fertility loss (percent)			Compensation period			Net loss (years)
	Province (1)	Rural (2)	Urban (3)	Province (4)	Rural (5)	Urban (6)	Province (7)	Rural (8)	Urban (9)	Province (10)
China	1959–61	1959–61	1959–61	109.0	112.0	96.0	1963	1963	—	0.9
Anhui	1958–61	1958–61	1959–61	199.5	208.4	120.1	1962–64	62–63, 65	1963	1.2
Sichuan	1959–62	1959–62	1960–62	186.5	187.7	121.0	1963	1963	—	1.6
Qinghai	1959–61	1959–61	1960	155.9	172.4	22.0	1964–65	1964–65	1961–65	0.9
Henan	1958–61	1958–61	1959–61	145.2	151.2	60.5	1963	1963	1963	1.0
Ningxia	1959–61	1959–61	1958–62	140.4	152.1	175.1	1962	1962	1963	1.3
Shandong	1958–61	1958–61	1959–61	134.1	136.8	93.1	1963	1963	1963	1.1
Hunan	1959–61	1959–61	1959–61	132.4	137.0	99.5	1963	1963	—	1.0
Jiangsu	1958–61	1958–61	1960–61	128.3	138.6	53.1	1963	1963	1963	1.1
Liaoning	1959–62	1958–61	1959–62	122.3	103.7	140.0	1963	1963	—	1.0
Guizhou	1959–61	1959–61	1959–62	122.0	123.8	177.9	1963	1963	—	1.0
Gansu	1959–61	1959–61	1959–61	119.9	129.7	86.2	1962–64	1962–63	1962–63	0.6
Hebei	1959–61	1959–61	1959–62	108.4	108.1	134.4	1963	1963	1963	0.8
Yunnan	1959–61	1959–61	1959–61	105.0	106.4	96.1	1963	1963	1963	0.9
Zhejiang	1959–61	1959–61	1959, 61	99.9	105.6	59.2	1963	1963	1963	0.8
Hubei	1959–61	1959–61	58, 60–61	95.4	102.1	69.8	1962–63	1962–63	1963	0.5
Jiangxi	1959–61	1959–61	1959, 61	77.9	78.6	78.9	1963	1963–64	—	0.5
Fujian	1959–61	1959–61	1959, 61	77.3	95.4	65.6	1963	1963	—	0.5
Guangdong	1959–61	1959–61	1959–61	77.1	74.6	93.7	1963	1962–63	—	0.6
Shaanxi	1959–61	1959–61	1958–61	75.4	71.6	117.6	1963	1963	1963	0.6
Guangxi	1959–61	1959, 61	1959–61	67.2	49.0	115.2	1963–64	1963–65	—	0.2
Neimonggu	1959, 61	1959, 61	1959, 61	63.1	56.2	74.2	—	—	—	0.6
Jilin	1959, 61	1959, 61	1959–61	55.8	43.2	105.7	1963	1963	—	0.4
Xinjiang	1959, 61	1959, 61	1959–61	46.3	46.6	90.4	—	1964	—	0.5
Shanxi	1960–61	1960–61	1959–61	43.3	41.9	64.1	1962–63	1962–63	1963	0.03
Heilongjiang	1961	1961	1959, 61	31.1	29.1	67.2	—	—	—	0.3
Beijing	1958–61			123			1963			1.0
Tianjin	1959–62			113			1963			1.1
Shanghai	1958–61			177			—			1.8

— = no period of compensation.
SOURCE: China's national One-Per-Thousand-Population Fertility Survey, 1982.

interior, with a gap in the center. In southeastern China, fertility losses were more moderate. All five provinces in this region, together with some provinces in the central north–south belt, fall into the third group. The provinces in which the fertility loss was smallest (the index was less than 65 percent) were Heilongjiang, Jilin, Neimonggu (Inner Mongolia), Shanxi, and Xinjiang. In general, the extreme northern and southern provinces suffered least, while central China was hardest hit.

Fertility recovery was pronounced in 1962, when indexes of incomplete total fertility returned to normal levels in all but two provinces (Sichuan and Liaoning). In some provinces the recovery had begun even earlier. This was the case in Anhui, one of the earliest provinces to be affected by the crisis and one in which the fertility loss had been exceptionally severe. The recovery was followed in 1963 by the largest fertility boom in the history of the People's

FIGURE 1 Levels of total fertility loss (TFL), China, 1958–62



NOTE: For definition of total fertility loss, see text.
SOURCE: Table 1, column 4.

Republic. The boom did not last long, however, and by 1964 fertility had returned to mid-1950s levels in most provinces.

In no province was the total fertility loss during the crisis period fully compensated for, irrespective of the absolute magnitude of the loss. An extreme example is provided by Sichuan Province: even after recovery, the net fertility loss in this province still exceeded 160 percent of a normal year's births (col. 10). For China as a whole, the net fertility loss amounted to about 90 percent of a normal year's births, and in only three provinces was it less than 40 percent.

Rural–urban differences Since China's population is predominantly rural, the rural fertility crisis was similar to that of the nation as a whole.

The fertility crisis occurred at roughly the same time in urban and rural areas (see Table 1), but a short time lag was found in several provinces. During the early stages of the crisis, the urban populations fared relatively better. By 1961, however, the fertility crisis in the majority of urban areas was as bad as, or worse than, that in the countryside. Moreover, the rural areas recovered from the crisis more quickly than did urban areas.

For China as a whole, total fertility loss in the rural areas exceeded that in urban areas by about 15 percent. But in 12 provinces, including eight in the far north or northeast of China and three in the south, urban fertility losses exceeded those in the countryside. Most of these provinces experienced comparatively moderate rural fertility loss. Apart from the three large municipalities, total urban fertility loss was as great as or greater than one normal year's births in nine provinces; total rural fertility loss was this high in 15 provinces. On the other hand, the indexes of urban fertility loss were less than 75 percent in three eastern coastal provinces (Jiangsu, Zhejiang, and Fujian) and in five contiguous provinces forming a north–south band traversing the middle of the country (Heilongjiang, Neimonggu, Shanxi, Henan, and Hubei). Regional differences in fertility crisis were less pronounced in urban than in rural areas.

In all three major cities the shortfall in fertility lasted for at least four years, and in each case the total fertility loss was higher than the national average. Shanghai is a special case: the fertility decline in that city began in 1958, and full recovery has never occurred. Even in 1963, when the rest of the country experienced a baby boom, the index of incomplete fertility in Shanghai was about 20 percent below the level of the mid-1950s. Beijing and Tianjin, on the other hand, were closer to the national pattern. Fertility in these two cities recovered in 1963, but only in Beijing was the compensation sizable, amounting to about 20 percent above the level of the mid-1950s. After 1964 the trend in Beijing and Tianjin was similar to that in Shanghai. In fact, China's urban fertility transition predated, and to some extent overlapped with, the fertility crisis. It is impossible to separate the fertility impact of these two phenomena. Therefore, the measures used here probably overestimate the effects of fertility crisis in the urban areas, especially in the three major municipalities.

Excess mortality

China experienced very rapid mortality decline during the 1950s. According to one set of figures, the national crude death rate fell from 20 per thousand population in 1949 to 14 in 1953, and to 10.8 per thousand in 1957, a 46 percent decline in this eight-year period. This monumental achievement to a large extent was attributable to the cessation of warfare, a reduction in the degree of extreme poverty, and great improvements in health care.[5] Increased fertility, which affected the age composition of the population, also contributed to the decline in the crude death rate.[6]

This downward trend in mortality, however, was reversed after the launch of the Great Leap Forward. The national death rate rose slightly in 1958 and reached a peak of 25.4 per thousand in 1960, only returning to pre-Leap levels in 1962.[7] If we assume that the national crude death rate would have remained at the levels of 1956 and 1957 without the Leap, then excess mortality, defined as deaths exceeding those that would have occurred had previous conditions prevailed,[8] was about 1.9 times a normal year's total deaths according to official data.

The quality of China's vital registration in the past, particularly during the period of demographic crisis, has been the topic of frequent debate.[9] Based on intercensal adjustment, the completeness of reporting during 1958–62 was estimated to be roughly 85 percent for births and 64 percent for deaths.[10]

The 1982 census age distributions are now available for all provinces. However, it is not possible to adjust for reporting errors by employing the intercensal procedure in the absence of detailed data on interprovincial migration, which was extensive, especially in the early period of the Leap. For instance, net outmigrants from Hunan Province during 1959–61 reportedly amounted to more than 1.5 million, or about 4 percent of the province's total population.[11] It is also implausible that the magnitude of misreporting was the same in all provinces, given disparities among them in education, administrative efficiency, and the like.

However, our focus is on the regional patterns of mortality crisis rather than on estimation of the exact number of excess deaths. If we make the assumption that in each province the extent of underreporting on mortality was the same before and throughout the crisis period, the relative magnitude of a province's excess mortality can be conservatively estimated by examining the original statistical data and making only minor adjustment.

The question here is what should be regarded as the mortality level under normal conditions. John Bongaarts and Mead Cain suggest that immediately after an episode of massive excess deaths, the mortality level will be lower than normal because of the impact of Darwinian selection.[12] Thus, the average of crude death rates in 1956 and 1957, the years immediately before the Great Leap, has been taken as the reference. Excess mortality, then, can be estimated by assuming that, in the absence of the crisis, mortality would have remained constant at the pre-Leap level. Such a criterion may underestimate the excess deaths, since mortality might have been expected to continue its decline absent the crisis.

The time series of provincial mortality data for the period concerned are not available for all provinces. It is possible, however, to draw a picture based on information for 18 of China's provinces. The national data also show us that the rural population suffered greater excess mortality than did the urban population. Unfortunately, provincial data on mortality are not available for rural and urban populations separately. Because an overwhelming majority of China's population—more than 80 percent—live in rural areas, the provincial death rate is mainly determined by the situation in the countryside.

Regional differences in mortality levels were marked during the pre-Leap period. The reported crude death rates in 1957 for 28 provinces (data for Tibet are not available) in mainland China ranged from a low of 6 per thousand in Shanghai to a high of 16 per thousand in Yunnan.[13] Apart from these extremes, the crude death rate for most provinces ranged between 9 and 13 per thousand.

Excess mortality occurred in all provinces. Its duration, however, varied substantially, ranging from two years in Xinjiang and Henan to five years in Jilin, Shandong, and Sichuan (see Table 2). The extreme length of the mortality crisis in some provinces must be set against their very low crude death rates in the reference period, which may reflect reality or simply reporting errors.

In 1958, while mortality levels in most provinces remained constant or continued to decline, crude death rates in five of the 18 provinces for which data are available rose by at least 5 percent. The mortality crisis seems to have started much earlier in Sichuan and Gansu.

TABLE 2 Excesses in crude death rates (per 1000) relative to reference levels: Selected provinces of China, 1958–62

Province	Reference CDR (1)	Changes in CDR (relative to reference CDR) 1958 (2)	1959 (3)	1960 (4)	1961 (5)	1962 (6)	Sum[c] (7)	Excess CDR 1958–62[d] (8)
China								
Total	11.100	0.079	0.314	1.291	0.283	−0.097	1.967	21.834
Urban	7.950	0.160	0.374	0.732	0.433	0.042	1.741	13.841
Rural	11.455	0.091	0.275	1.495	0.273	−0.099	2.134	24.445
Hebei	11.320	−0.035	0.086	0.399	0.204	−0.200	0.689	7.800
Shanxi	12.150	−0.037	0.053	0.169	0.004	−0.070	0.226	2.750
Liaoning[a]	9.400	−0.064	0.255	0.223	0.862	−0.096	1.340	12.596
Jilin[a]	9.050	0.008	0.484	0.119	0.331	0.101	1.043	9.439
Heilongjiang	10.250	−0.112	0.249	0.024	0.083	−0.151	0.356	3.650
Jiangsu	11.645	−0.193	0.249	0.581	0.146	−0.110	0.976	11.375
Shandong	12.100	0.058	0.504	0.950	0.521	0.025	2.058	24.902
Henan	12.905	−0.016	0.094	2.069	−0.211	−0.378	2.163	27.914
Hunan	10.960	0.063	0.185	1.684	0.596	−0.067	2.528	27.707
Guangdong[a]	9.810	−0.069	0.197	0.541	0.088	−0.050	0.826	8.100
Guangxi[b]	9.770	−0.021	2.146	0.676	0.218	0.143	3.183	31.098
Sichuan[a]	12.070	1.085	2.891	3.471	1.437	0.211	9.095	109.777
Guizhou	12.665	0.099	0.600	3.131	0.837	−0.083	4.667	59.108
Gansu	11.050	0.910	0.575	2.738	0.041	−0.258	4.264	47.117
Ningxia[a]	11.000	0.345	0.454	0.164	0.045	−0.227	1.008	11.088
Xinjiang	14.100	−0.078	0.312	0.099	−0.164	−0.326	0.411	5.795
Tianjin	9.615	−0.048	0.089	0.135	0.093	−0.186	0.317	3.045
Shanghai	6.400	−0.078	0.078	0.063	0.203	0.141	0.485	3.104

NOTE: The average of CDR in 1956 and 1957 has been taken as the reference level. Relative changes in CDRs are calculated as the ratio of CDR in the given year to CDR in the reference year, minus 1.

[a] The reference value is the CDR in 1957.

[b] Data refer to Fangcheng County only.

[c] Sum of relative excesses during 1958–62.

[d] Calculated as Col. (1) × Col. (7).

SOURCES: See Appendix.

The crisis became nationwide in 1959, when excess crude death rates were recorded in all 18 provinces. In most provinces the largest yearly excess death rates occurred in 1960; however, the highest rates occurred a year earlier in Jilin, Heilongjiang, and Guangxi. The first two provinces in this group are located in northeast China. While the country largely recovered from the disaster in 1962, the mortality crisis persisted in five provinces (Jilin, Shanghai, Shandong, Guangxi, and Sichuan).

Although all provinces experienced the mortality crisis, the timing and magnitude varied. Sichuan was an extreme case: its crude death rate in 1958 was 25 per thousand, more than double its pre-Leap level. Even allowing some discount for a very low reference value, the rise was still extraordinary. Next to Sichuan was Gansu, where the crude death rate in 1958, 21 per thousand, was 90 percent higher than the reference value.

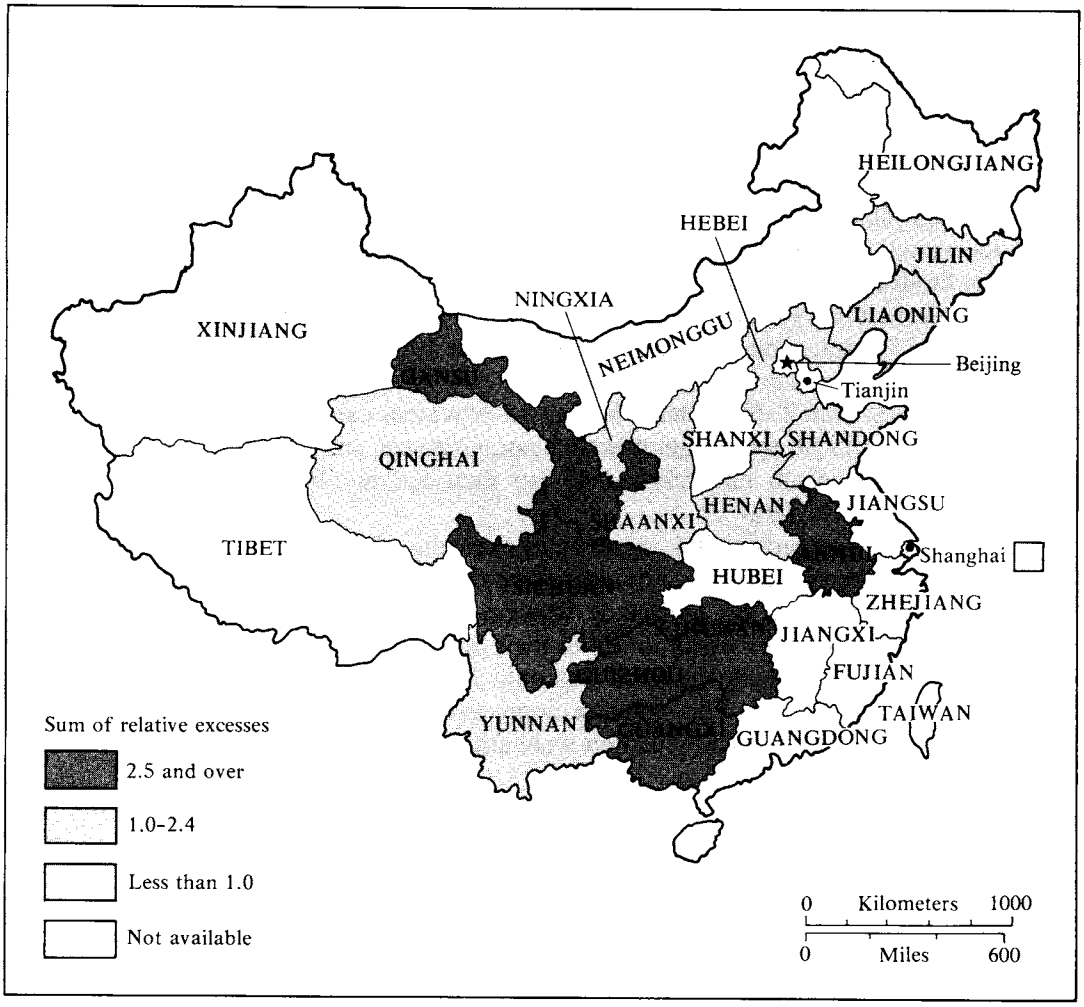
One can see from Table 2 that while all 18 provinces experienced some excess mortality in 1959, the situation in Sichuan, Guangxi, and Guizhou was extreme. The crude death rate reached 47 per thousand in Sichuan, 31 in Guangxi, and 20 in Guizhou.

Six provinces recorded crude death rates exceeding 20 per thousand in 1960. The most severely affected provinces were once again Sichuan (54 per thousand) and Guizhou (52 per thousand). The crude death rates in those two provinces in 1960 were more than four times their precrisis levels. In contrast, the death rate in Heilongjiang Province was only 2.4 percent higher in 1960 than in the reference period. The situation improved somewhat in 1961, but crude death rates in Sichuan and Guizhou were still as high as 29 and 23 per thousand, respectively.

The cumulative magnitude of excess mortality by province, estimated by summing the annual relative excesses in crude death rates, varied more widely. In eight of the 18 provinces with data available, the sum of excess mortality was less than a normal year's total deaths, while in six other provinces it was 1.0–2.5 years. In the remaining four provinces, the excess deaths amounted to more than three times a normal year's total. Mortality in Sichuan Province was extremely high, with total excess mortality during the period 1958–62 amounting to more than nine years' worth of normal mortality.

Time series of data on crude death rates are not available for the remaining provinces. But these provinces can be broadly grouped, based on fragmentary information that I gathered. Jiangxi Province is unlikely to have experienced severe mortality crisis. While almost all provinces experienced negative population growth in 1961, the rate of natural increase in Jiangxi was still as high as 10 per thousand.[14] Zhejiang, Hubei, and Fujian are believed to have experienced patterns similar to that in Jiangsu Province,[15] in which the rate of natural increase was positive. That the situation in Neimonggu was also not severe can be inferred from the large flow of inmigrants during that period.[16] The excess mortality in Anhui was reportedly similar to that in Sichuan Province.[17] Figure 2 shows the estimated regional patterns of the mortality crisis. As can be seen, the western part of China, from Gansu in the north to Guizhou

FIGURE 2 Levels of excess mortality, China, 1958–62



SOURCE: Table 2, column 7 and fragmentary data.

in the south, suffered most severely. Provinces situated in the far north and the major municipalities seem to have been less affected. The situation in the southeast was in between.

Many attempts have been made to estimate the actual number of excess deaths during the Great Leap. Based on a variety of approaches and assumptions, the estimated figures for all of China range from 16.5 million by Ansley Coale to 29.5 million by Basil Ashton et al.[18] In this article, the numbers of excess deaths are estimated from provincial data.

Excess deaths are first calculated for 14 provinces for which the time series of crude death rates and population figures are available.[19] The number

of registered deaths is estimated or adopted directly from the provincial vital statistics. Deaths in the absence of crisis are estimated by using the reference value of the crude death rate and annual population figures. The total excess deaths based on vital statistics without adjustment for underreporting are then derived. The estimated number of excess deaths was about 14.2 million. This means that about 3.6 percent of the total population in those 14 provinces was lost to excess mortality during the period 1958–62.

Sichuan Province suffered more than half of this loss, or a total of 7.5 million excess deaths. In 1960 alone excess deaths in Sichuan reached 2.8 million, amounting to about 4 percent of the total population of the province. Shandong, Henan, Hunan, and Guizhou each suffered excess deaths greater than one million.

The total population in these 14 provinces accounted for about 61 percent of the national total during that period. Therefore, assuming that the experience for the remaining provinces was on average similar to those we measured and that the underreporting of deaths was some 10 percent higher during the crisis than in the preceding period, the total number of excess deaths for China as a whole may have amounted to 23 million.

This is a very rough estimate that should be interpreted with great caution. The reliability of some provincial data is open to question. In addition, estimation of national figures from provincial data may introduce distortion. More work is necessary to reconstruct China's population history for this period.[20]

We may conclude from the foregoing discussion that the demographic consequences of the Great Leap Forward were severe, both in terms of massive fertility reduction and in terms of excess mortality.

Provinces with heavy birth deficits in general suffered severe excess mortality as well. In the northern provinces of Heilongjiang and Shanxi no significant crisis was recorded. Central China suffered the longest and most severe demographic crisis in terms of both fertility and mortality. The southwestern province of Sichuan experienced the heaviest fertility loss and the greatest excess deaths of any province during the period.

What caused this demographic crisis? One direct impact of the Great Leap on daily life was the nationwide food shortage, which, as one might expect, was in part responsible for the demographic crisis. Recent work on the effects of famine, however, has stressed that it can occur in the absence of a significant decline in food availability. Amartya Sen argues that some famines have been brought about mainly through entitlement failure rather than through declines in food availability.[21] In the case of China, however, the causes of famine were more complicated than Sen's analysis might suggest. We show in the following section that China's 1959–61 famine was a consequence of a combination of the decline in grain production, entitlement failure, and changes in consumption patterns, all of which were directly connected with the Great Leap Forward.

Food supply and consumption patterns

The Chinese diet is largely dependent on foodgrains. According to an estimate by Vaclav Smil, about 90 percent of the caloric content and 80 percent of the protein intake in the Chinese diet comes from grains.[22] Therefore, China's food problem was largely a grain problem.

In 1953 the Chinese government assumed control over grain production and consumption, instituting a rationing system known as central purchase and supply. Shortly after the launch of the Great Leap in 1958, the free market for grain trade was abolished; and although the free market was reopened in the early 1960s, it was still strictly controlled by the state. This suggests that market mechanisms by and large were not involved in determining grain consumption in China during the period in question.

Under the central purchase and supply system, an individual's grain consumption was primarily determined by the classification of his household as agricultural or nonagricultural.[23] Grain consumption for most of the agricultural population was dependent on local grain production and government grain procurement, consisting of an agricultural tax, central purchase, and optional sales. In circumstances such as natural disaster, the state provided some subsidiary grain, but in general the agricultural population was responsible for feeding itself. By contrast, the chief source of grain for the nonagricultural population, most of it urban, was government supply. Urban residents received a fixed ration of grain at a fixed price. Thus, they could always rely on the state no matter what the size of the last harvest. In other words, basic food availability for this part of the population was guaranteed so long as no cut in grain rations occurred. Rural households located in non–grain-producing areas received grain supplies from the state on the same principle as the urban population. China was a net grain-exporting country until 1961; therefore, during the period in question grain consumption for these two populations was determined primarily by grain procurement and state grain storage.

Grain production

The grain harvests in the pre-Leap years of 1956 and 1957 were reasonably good. National total grain output is estimated to have amounted to 192 and 195 million tons in the two years.[24] We take the average of grain output in these two years as the reference value.

A bumper harvest was reported in 1958. Total grain output in that year reached a high of 200 million tons. Grain production then declined over the next several years. The national grain output declined by 12 percent in 1959, 26 percent in 1960, and 24 percent in 1961 from the 1956–57 reference level. China's grain production recovered slowly beginning in 1962, but not until 1965 did output return to the pre-Leap level.

Regional differences in changes in grain production were considerable. Although a very good harvest was reported in 1958 at the national level, in

five provinces the total grain output was more than 5 percent below the output of previous years.[25] In 1959 grain production was below the reference level in 21 out of 28 provinces, and the reduction was more than 10 percent in 12 provinces. The sharpest reduction occurred in Gansu Province, where grain output in 1959 was 38 percent below the reference level. The declines in Anhui, Sichuan, and Hubei exceeded 25 percent. Although not as good as in 1958, the 1959 harvests in the remaining seven provinces were more abundant than the reference levels.

The situation in 1960 grew worse. All provincial-level units except Shanghai experienced declines in grain production. The most severely affected provinces, where the reduction of grain output exceeded 30 percent, were Gansu, Liaoning, Sichuan, Guizhou, Qinghai, Shandong, and Anhui. In Gansu, following the bad harvest in the previous year, the grain output in 1960 was only 39 percent of that in pre-Leap years.

Grain output was as poor in 1961 as it was in 1960. A reduction of over 30 percent relative to precrisis levels was reported in ten provinces. The most severely affected were Gansu, Sichuan, and Henan, where the reduction exceeded 40 percent. All provinces except Gansu witnessed some degree of recovery in 1962.

Causes of the decline in grain production

Many factors were responsible for the decline in grain production. In a country like China, with an agrarian society and a backward agricultural technology, climate has a decisive effect on food availability. Observers in the West once referred to China as the "land of famine";[26] natural disaster has continually visited the country.

The impact of natural disaster on grain production was significant during 1959–61. Prolonged drought, heavy flooding, and other natural calamities severely damaged agricultural production.[27] Nevertheless, the impact of natural disaster on grain production during the Great Leap should not be overstated. According to government statistics, the disaster-affected areas—areas where crop production was reduced by more than 30 percent from the reference level due to natural disaster—comprised 13.73 million hectares in 1959, or about 9.6 percent of the total sown area.[28] The affected areas increased to 24.98 million hectares in 1960 and 28.83 in 1961, representing 16.6 and 20.1 percent of the total sown area, respectively. Nevertheless, the scale of the natural disasters in 1959 was similar to, if not smaller than, that of the reference years, 1956 and 1957. Disaster-affected areas in these two years amounted to 15 million hectares, and the percentage of the total sown area was also 9.6. Even in 1962 and 1963, when the crisis had subsided, disaster-affected areas still amounted to 16.67 and 20 million hectares, respectively.[29]

Indeed, the national figure of grain yield per hectare sown in 1959 was 5 percent higher than in 1956 and 1957. The provincial picture varied: in 13 provinces the grain yield per hectare was lower than in the reference years, while in six others the increase exceeded 10 percent. The natural disasters in

1960 and 1961 were undoubtedly severe. The grain yield per hectare fell in almost all provinces. Nevertheless, natural disaster should not have resulted in such a substantial decline in grain output, other things being equal. It is more likely that the reduction was caused by human factors.

The impact of the great contraction in the grain-sown areas on grain production has not received enough attention. China's grain-sown area has been continually shrinking since the 1950s. The decline was extremely large in 1959: the grain-sown area in that year was 14 percent smaller than in previous years.[30] If we assume that the grain yield in the areas withdrawn from cultivation would have remained the same as in pre-Leap years, the contraction in the grain-sown areas alone would have resulted in a reduction of grain output of 26.46 million tons.

Grain output declined in 1959 in 20 out of 28 provinces.[31] In 15 of these, contraction in the grain-sown area accounted for at least half of the decline. The reduction of output in eight provinces can be entirely attributed to the reduction of the grain-sown area. Guangdong's grain-sown area, for example, was 21 percent smaller than it was in the pre-Leap era, leading to a 20 percent decline in grain output. Serious declines in grain yield per hectare in 1959 were reported only in Shandong, Henan, Yunnan, Gansu, and Jiangxi.

Except where land was converted to industrial use, the reduction in the grain-sown area was the result mainly of changes in government agricultural policy. In 1958 many signs indicated a bumper harvest, and a "wind of exaggeration" blew throughout the country. At one point, reported grain output from the provincial level reached the incredible figure of 500 million tons[32]—some 2.5 times the actual figure. Falsely informed, the Chinese government thought the food problem had been solved, and the question remaining was not how to produce enough grain but how to consume it. Directives were issued from the center, and a system called "three-three," coupled with the principle of "Sowing less and harvesting more,"[33] was introduced. Under this system, one-third of the arable land was to be used for grain crops, one-third for cash crops, and the remaining third for rotation. There was some resistance, and some provincial authorities proceeded cautiously in implementing the policy.[34] Nevertheless, a major contraction in the grain-sown areas occurred, resulting in the sharp decline in grain output.

The government soon realized that the system was not working, and some land was returned to grain cultivation in 1960. Although the grain-sown area in China as a whole was still smaller than in pre-Leap years, arable land used for grain production did expand impressively in six provinces. In Xinjiang, the grain-sown area in 1960 increased by 65 percent. The slogan became "Sowing more and harvesting more." The impact of the contraction of grain-sown areas on grain production declined, but the national figures show that the contraction of grain-sown areas still accounted for 35 and 40 percent of the reduction in grain production in 1960 and 1961, respectively. Thus, the contraction in grain-sown areas must be considered one of the decisive causes of the decline in grain output during the crisis period, especially in 1959.

Other factors aggravated the situation. Uniform methods of agricultural production were introduced, regardless of differences in local environment, and application of these methods was often counterproductive.[35] With the progress of the campaign for steel and iron, millions of members of the commune labor force—usually the best workers—were diverted from agricultural activities to mine coal and produce iron in badly built backyard blast furnaces. In addition, rural-to-urban migration was high in the early years of the Leap, as a result of the great expansion in industrial construction and the relaxation of central control of labor recruitment. The rural labor force remaining in agriculture was decimated, not only in absolute numbers but also in quality, since many workers were inexperienced or physically weak. The ratio of agricultural to industrial labor declined sharply and suddenly, from 13.8:1 in 1957 to 3.5:1 in 1958.[36] Manpower shortages were widely reported.[37] For those left in agriculture, productivity was further reduced by the lack of work incentives owing mainly to the establishment of the commune system. Food shortages in rural areas also resulted in declines in labor productivity.[38]

Per capita grain output

A more significant indicator of food shortages is the change in grain output per capita. The national figure for grain output per capita was about 308 kg. in 1956 and 1957 (see Table 3). In 1958 per capita grain output for China as

TABLE 3 Percent changes in per capita grain output relative to reference levels: Selected provinces of China, 1958–65

Province	Reference	1958	1959	1960	1961	1962	1963	1964	1965
China (total)	308.08	− 1	−17	−30	−28	−22	−19	−13	−12
Hebei	208.68	8	− 6	−21	−25	−17	−33	−10	−14
Shanxi	255.20	13	− 3	−22	−19	−15	− 7	6	− 2
Liaoning	289.13	0.0	−17	−51	−45	−37	−25	−28	−16
Jilin	374.00	11	8	−23	−25	−20	−12	−17	−14
Heilongjiang	519.35	11	1	−41	−51	−41	−30	−33	−19
Jiangsu	262.58	2	−11	−14	−19	−14	− 3	15	20
Zhejiang	310.25	0.0	− 3	−18	−20	−14	− 2	− 1	2
Anhui	297.13	−12	−31	−30	−30	−26	−26	−15	1
Fujian	324.40	− 4	−16	−35	−37	−32	−27	−21	−19
Shandong	237.53	− 4	−18	−34	−32	−28	−24	−15	− 1
Henan	250.00	2	−22	−26	−43	−27	−38	−25	−11
Hunan	307.65	10	− 2	−28	−26	−06	−19	− 6	− 7
Sichuan	309.30	3	−27	−36	−43	−28	−17	−17	− 5
Guizhou	313.18	− 1	−22	−40	−36	−29	−29	−16	−12
Yunnan	320.90	−11	−17	−20	−18	−14	−16	− 8	−14
Gansu	472.44	−19	−32	−56	−51	−54	−37	−36	−25
Beijing	188.88	− 3	−54	−59	−56	−42	−38	−32	−18
Tianjin	174.15	35	−11	−14	−13	7	13	15	7
Shanghai	117.43	− 1	− 8	− 5	− 7	2	12	35	36

NOTE: The average of per capita grain output in 1956 and 1957 has been taken as the reference level. All measures are in terms of unprocessed grain (kg.).
SOURCES: See Appendix.

a whole declined by one percent, despite the bumper harvest in that year. Output per head declined continually over the following years. Official data show a 17 percent decline in 1959, a trough in 1960, when the per capita grain output was only 70 percent of the reference value, and a similar situation in 1961. Output had not returned to its pre-Leap level even by 1965.

At the heart of China's grain problem in the 1950s was distribution.[39] Substantial inequality in per capita grain output existed between provinces. Not surprisingly, the large municipalities had the lowest per capita output. So far as the provinces and autonomous regions are concerned, output in the pre-Leap reference period—1956 and 1957—ranged from a high of 519 kg. for Heilongjiang to a low of 209 kg. in Hebei. Adopting the criterion used by Kenneth Walker, provinces can be categorized into three groups: poor, adequate, and rich.[40] Among the rich provinces, where the average grain output per head in the reference period exceeded 310 kg., were Heilongjiang, Jilin, Jiangxi, Hubei, Gansu, Neimonggu, Xinjiang, Guangdong, Fujian, Yunnan, Guizhou, and Zhejiang. The poor group (per capita grain output below 275 kg.) consisted of seven provinces—Hebei, Shandong, Henan, Shaanxi, Shanxi, Jiangsu, and Guangxi—and the three large cities—Shanghai, Beijing, and Tianjin. The remaining five provinces comprised the adequate group. Most provinces in the far north and in the south fell into the rich and adequate categories, leaving provinces in the northcentral part of the country and the cities in the poor group.

In 1958 the numbers of provinces that fell into the rich, adequate, and poor categories were six, five, and eight, respectively, for the 19 provinces for which time series data are available. Per capita grain output in Gansu, Yunnan, and Anhui declined by more than 10 percent, but only Anhui shifted to the poor group. The regional pattern remained as before.

By 1959 the numbers of provinces in these categories had shifted to two, two, and 15. Except for Heilongjiang and Jilin, all others experienced a decline in per capita grain output. A drop of more than 20 percent was reported in Gansu, Anhui, Sichuan, Henan, and Guizhou.

In 1960 grain output per capita in all but Heilongjiang and Jilin was below the adequate level (275 kg.). Fourteen out of 19 provinces suffered a decline of more than 20 percent, while the reduction in nine provinces equaled or exceeded 30 percent. The situation in 1961 improved only slightly.

Even in 1962, by which time the country had recovered from the crisis, 20 out of 28 provinces still fell into the poor group. This is clear evidence of a nationwide decline in food availability.

Generally speaking, the regional patterns of inequality in per capita grain output persisted throughout the crisis period. Provinces with higher per capita outputs in the pre-Leap years maintained their positions during the crisis, but at much lower levels. In only three provinces—Heilongjiang, Jilin, and Yunnan—was per capita grain output consistently higher than 260 kg. In another six provinces—Zhejiang, Jiangsu, Anhui, Hunan, Fujian, and Shanxi—output per capita exceeded 200 kg. throughout the period. The former five were all

southeastern provinces. In Hebei, Henan, and Shandong Provinces, per capita grain output was consistently below 200 kg. In the remaining provinces, output levels fluctuated during the period.

Government grain procurement

Grain procurement is one of the major policy measures adopted by the Chinese government to control grain production and consumption. It both guarantees grain supplies to the nonagricultural population and equalizes rural grain consumption. In the absence of a free market in grain, procurement became one of the major determinants of consumption.

Before the Great Leap Forward, government procurement amounted to roughly 25 percent of the total grain output. Discounting grain resold by the state to the rural population, the net procurement rate was about 16 percent. Grain output in 1959 was 25 million tons less than in 1957, but procurement increased by 19.3 million tons. Gross procurement rose to 29.4 percent of total output in 1958 and jumped to 39.7 percent in 1959. Net procurement rates were 20.9 percent and 28 percent in those two years. Grain output in 1960 was 51.5 million tons less than in 1957, but the procurement was 3 million tons more. The gross and net procurement rates in 1960 were 35.6 and 21.5 percent, respectively.[41] Such a high procurement rate was later criticized as "draining the pond to catch the fish."[42] Several factors were responsible for these rising rates of procurement.

With the progress of the Leap, the demand for the government to procure and redistribute grain, in both urban and rural areas, was unprecedented. As noted earlier, one of the main aims of the Leap was to accelerate China's industrialization. Manpower was regarded as a substitute for the missing capital. Industrial enterprises expanded sharply, recruiting labor from the countryside. As a result, China's urban population increased from 99.49 million in 1957 to 107.21 million in 1958, 123.71 million in 1959, and 130.73 million in 1960. Clearly, most of the increase was due to large-scale rural-to-urban migration. The urban labor force increased by even greater margins: in 1957 people working in state and collective enterprises numbered 31 million. The figure in 1958 was 52 million, an increase of over 20 million in a single year.[43] This sudden expansion of the nonagricultural population placed great pressure on the government, since the grain supply for the urban population relied entirely on the state procurement system. In order to guarantee the priority of industry, precedence was given to the grain supply for urban residents.

Meanwhile, the rural demand for commercial grain also rose sharply because of the contraction of grain-sown areas. Implementation of large irrigation and other construction projects also increased the demand for state grain, as workers on these projects relied in part on grain subsidies. A segment of the rural population shifted from self-provision to reliance on the state for commercial grain. National statistics show that grain sales to the rural population rose from 7 million tons in 1957 to 8.5 million in 1958, and reached a peak of 10 million tons in 1960. In Sichuan Province, 0.48 million tons of

grain were resold to the rural population in 1958. The figure rose to one million tons in 1959 and to 1.66 million in 1960.[44]

As a result, heavy pressures were exerted on the government to control and redistribute more grain. Such pressures would inevitably result in higher procurement levels unless grain imports from abroad increased.

Moreover, the government, as already stated, was misled by vastly inflated production reports. As is well known, in the extraordinary political atmosphere of that time output figures were widely exaggerated. As politics took command over the statistical reporting system, that system almost ceased to work. The total grain output reported in 1958 initially amounted to more than 500 million tons. Although the figure was later revised downward, the first published figure of 375 million tons was still double the 1957 grain output. Many people suspected these reports of being erroneous, but in the political atmosphere of the Leap few people wanted to challenge them. The "wind of exaggeration" blew continually in 1959, leading the central government to believe that more grain could be purchased from the peasants.

The formation of communes facilitated grain procurement. Having successfully completed the formation of higher stage agricultural producers' cooperatives in 1956, China prematurely pursued the more ambitious step of communization starting in the spring of 1958. The communization movement accelerated soon after the Beidaihei Conference held in August of that year. By November 1958, 120 million peasant households, or 99 percent of the rural population, had reportedly joined communes.[45] The commune was praised for its large scale and public ownership. Early in the movement the typical commune consisted of more than 5,000 households. The basic accounting unit was the brigade, or in some cases even the entire commune.[46] The household lost its importance as a unit of production and management, taxation, and consumption. The commune owned the land, managed production, and controlled the output of farm products. Thus, the unit that the government dealt with in grain procurement was no longer the individual household or the small collective, but rather the large-scale commune.

In addition, local officials—especially commune cadres, sometimes under strong pressures—were eager to record achievements that were viewed as measures of political commitment and means to career promotion. Farm production was greatly exaggerated. Grain was oversold to the state, leaving less for consumption by commune members. In this way, rural institutional changes implemented during the early stage of communization enabled the state to mobilize and procure large amounts of grain with seeming ease.[47]

In sum, the Great Leap Forward created a greater demand for grain; promoted the illusion that more surplus grain was available; and finally, through institutional change, made grain procurement by the central government easier. These factors worked together to produce an unprecedentedly high level of procurement, especially in 1959. However, the government was still unable to meet the increased need. The grain trade deficit was 6.2 million tons in 1960 and 6 million tons in 1961.[48] The government had to dip into grain reserves to feed the rapidly expanding urban population and to carry out the

Leap itself. By the end of June 1957, the state had built up its grain reserves to 18.2 million tons. This stock was probably further increased in 1958. Grain reserves decreased in successive years, however, falling to a low of 7.4 million tons in mid-1961.[49] The government eventually realized its mistake and reduced the procurement target in 1961. Grain imports then increased sharply, and China for the first time became a net grain-importing country.

High procurement was common in all provinces, but especially in grain-exporting provinces. The interest of the state was supposed to come first and localism was criticized.[50] Procurement was extremely heavy in 1959 and eased up slightly in 1960. Despite the decline in grain output, the procurement rate increased.[51] In Sichuan Province the state purchased about 30 percent of the grain output in the mid-1950s. The procurement rate increased to 49 percent in 1959 and remained at 46 percent in 1960.[52] In Heilongjiang, one of the major grain-exporting provinces, the net procurement rate climbed from about 44 percent in 1957 to 63 percent in 1960.[53] In Fujian the net procurement rate was as high as 40 percent in 1959.

Heavy procurement deprived the rural population of access to foodgrains and aggravated the food shortage in rural areas.[54] However, as Thomas Bernstein has pointed out, there is no evidence that the high procurements were deliberately designed to expropriate peasants, as in the Soviet Union in the early 1930s. In China high procurement levels were due to the extraordinary mismanagement of the Great Leap Forward.[55]

Per capita grain availability

In a market economy the entitlement to food is mainly determined by market mechanisms; in a peasant economy the harvest determines the peasant's direct entitlement.[56] The Chinese situation is different from both. There the production, procurement, and distribution of grain are organized by administrative measures.[57]

The decline in grain production and the high procurement levels placed China's peasants in a very precarious position with respect to grain consumption. During the period 1950–58 the average yearly grain consumption per capita of China's rural population was 190–205 kg. This figure fell to 183 kg. in 1959, and dropped further to around 150 kg. for the period 1960–63, a decline of more than 25 percent.[58] In other words, during the crisis Chinese peasants were allotted less than half a kilogram of grain to eat per day. It was estimated that the daily per capita food energy for Hunan's peasants in 1961 was only 1,441 calories, of which 25 grams were protein and 16 grams fat. These consumption levels were 34.3, 16.7, and 40.7 percent lower than the 1957 levels of calorie, protein, and fat intake.[59] Among the urban population, between 1957 and 1961 per capita consumption of grain declined by 8.4 percent, edible oil by 47.6 percent, and meat by 80.6 percent.[60]

As data on provincial grain consumption are not available, we estimate instead grain availability per capita for agricultural and nonagricultural populations.[61] The term "grain availability" in this article refers to grain available to a given population group after government procurement.

TABLE 4 Estimated per capita grain availability for agricultural and nonagricultural populations relative to reference levels: Selected provinces of China, 1958–63

	Reference		1958		1959		1960		1961		1962		1963	
Province	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**
Hebei	193.49	386.83	174.08	397.85	130.12	368.80	122.30	287.55	126.54	229.15	158.65	218.90	127.22	207.05
Liaoning	317.92	250.28	294.91	238.05	226.51	256.80	176.87	219.05	190.69	199.00	200.61	192.65	223.48	194.30
Heilongjiang	417.46		386.10		260.91		229.41		231.81		310.20		302.76	
Jiangsu	217.47	272.00	218.11	287.45	168.97	288.35	175.58	275.50	163.97	227.70	180.00	218.90	206.23	211.30
Anhui	229.00	309.40	186.48	313.40	155.57	236.00	166.42	174.55	171.16	182.90	174.28	174.30	176.85	163.25
Henan	197.16	351.80	176.99	432.75	143.58	356.85	142.63	263.75	123.64	190.65	150.57	187.95	137.97	199.25
Sichuan	204.03	221.65	211.65	274.60	132.99	286.05	137.09	253.35	134.62	216.45	167.64	219.95	190.70	219.45
Guizhou	224.05		209.54		145.22		140.74		160.95		162.78		159.92	
Yunnan	250.23	377.28	222.32	441.55	190.17	297.50	208.67	273.40	202.98	261.70	214.77	267.85	212.46	270.40

NOTE: The average of per capita grain availability for 1956 and 1957 has been taken as the reference level. Figures refer to trade grain (100 kg. of unhusked grain is equivalent to 83 kg. of trade grain).
SOURCES: See Appendix.

The grain available for the agricultural population is estimated by subtracting net grain procurement from total grain output.[62] Grain for the nonagricultural population is derived from statistics on grain supplies to urban and mining areas. It should be noted that neither of these figures measures real consumption. A certain proportion of the urban grain supply was used by industry to make such nonfood products as starch, and some was used for animal feed. Grain available to the rural population includes grain used for seed, livestock feed, and human consumption.

Per capita grain availabilities for the rural and urban populations are calculated for nine provinces (see Table 4). Before the Great Leap, grain available to the agricultural population following government procurement ranged from about 197 kg. per capita in Henan to 417 kg. in Heilongjiang. Grain availability per capita for agricultural populations in Sichuan and Hebei was around 200 kg. For the remaining five provinces the figures were within the range of 217–317 kg. Thus, even after government intervention, the inequality of rural grain consumption was still pronounced, and a large proportion of China's agricultural population lived at bare subsistence levels.

The situation deteriorated during the Great Leap period. In 1959 all nine provinces experienced a reduction in per capita grain availability exceeding 22 percent (see Table 5). In Sichuan and Guizhou the reduction was around 35 percent. The situation worsened in 1960 and 1961. A decline of about 45 percent in per capita grain availability was reported in Heilongjiang and Liaoning Provinces. The relative declines are somewhat misleading, however, since some areas continued to have sufficient grain in real terms. For instance, even after a 40 percent decline, the average per capita grain availability for Heilongjiang's rural population during 1959–61 was still 240.7 kg. On the other hand, average per capita grain availability for the agricultural population during 1959–61 was only 136.5 kg. in Henan, 135 kg. in Sichuan, and 126.3 kg. in Hebei. These figures include grain for seed and fodder. Countrywide, estimates suggest that about 100 million peasants had less than 0.25 kg. grain per day to eat during the crisis period.[63] Per capita grain availability did not return to pre-Leap levels until the mid-1960s.

Per capita availability was generally higher for urban than for rural populations. But there were exceptions. In Liaoning, for example, per capita grain availability in the reference period was 250 kg. for the nonagricultural population but 318 kg. for the agricultural population. Provincial differences in grain availability for the nonagricultural population were smaller than those for the agricultural population, but they were still substantial. In the reference period, the highest per capita grain availability for an urban population was 387 kg. in Hebei. This level was 75 percent higher than the lowest level of 222 kg. in Sichuan; for the rural population the highest level was 2.16 times the lowest.

The most prominent feature of Table 4 is the smaller decline in grain availability for the urban population than the rural population. In 1959 in four out of nine provinces per capita grain availability for the rural population was

TABLE 5 Percent changes in per capita grain output and availability relative to reference levels: Selected provinces of China, 1958–63

	1958			1959			1960			1961			1962			1963		
		Availability			Availability			Availability			Availability			Availability			Availability	
Province	Output	Rural	Urban	Output	Rural	Urban	Output	Rural	Urban	Output	Rural	Urban	Output	Rural	Urban	Output	Rural	Urban
Hebei	8	−10.0	2.9	− 6	−32.8	− 4.7	−21	−36.8	−25.7	−25	−34.6	−40.8	−17	−18.0	−43.4	−33	−34.3	−46.5
Liaoning	0	− 7.2	− 4.9	−17	−28.8	2.6	−51	−44.4	−12.5	−45	−40.0	−20.5	−37	−36.9	−23.0	−25	−29.7	−22.4
Heilongjiang	11	− 7.5		1	−37.5		−41	−45.0		−51	−44.5		−41	−27.8		−30	−27.5	
Jiangsu	2	0.3	5.7	−11	−22.3	6.0	−14	−19.3	1.3	−19	−24.6	−16.3	−14	−17.2	−19.5	− 3	− 5.2	−22.3
Anhui	−12	−18.6	1.3	−31	−32.1	−23.7	−30	−27.3	−43.6	−30	−25.3	−40.9	−26	−23.9	−43.7	−26	−22.8	−47.2
Henan	2	−10.2	23.0	−22	−27.2	1.4	−26	−27.7	−25.0	−43	−37.3	−45.8	−27	−23.6	−46.6	−38	−30.0	−43.4
Sichuan	3	3.7	23.9	−27	−34.8	29.1	−36	−32.8	14.3	−43	−34.0	− 2.3	−28	−17.8	− 0.8	−17	− 6.5	− 1.0
Guizhou	− 1	− 6.5		−22	−35.2		−40	−37.2		−36	−28.2		−29	−27.3		−29	−28.6	
Yunnan	−11	−11.2	17.0	−17	−24.0	−21.1	−20	−16.6	−27.5	−18	−18.9	−30.6	−14	−14.2	−29.0	−16	−15.1	−28.3

SOURCE: Based on Table 4.

below 150 kg., and it exceeded 200 kg. only in Heilongjiang and Liaoning. In contrast, in no province was the urban per capita grain availability below 200 kg. In fact, grain supplies for the urban population increased in four out of seven provinces in 1959. Grain supplies for urban populations declined in subsequent years, especially 1961, but per capita grain availability for urban residents never fell as low as that for the rural population. In 1960 urban grain availability in Hebei and Sichuan Provinces was roughly double the rural availability. These figures suggest that government controls over grain supplies for urban populations functioned well even in the crisis period. Although the rural population had somewhat better access to nongrain food than its urban counterpart, overall the food shortage was much more severe in rural China.

In summary, the impact of grain procurement on grain availability for the rural population is clear. The declines in grain availability in 1958 and 1959 were greater than the declines in grain output (Table 5). This suggests that heavy procurement worsened the situation of the rural population. But the reduction in grain availability in the early 1960s was smaller than the decline in output, clearly indicating the relaxation of procurement levels.

The above sections have examined the demographic consequences of the Great Leap and the food supply during that period. The question remaining to be answered is to what extent the famine was responsible for the demographic crisis.

The roles of famine and other factors in the demographic crisis

We have shown that substantial declines in grain production and availability started in 1959. We also know that the fertility deficit and excess mortality were sizable in 1958 in some provinces. Studies of demographic responses to famine have shown that the principal fertility response occurs nine months after the onset of the famine.[64] Our study uncovered no signs of severe famine in 1957 and 1958, even in those provinces such as Henan and Anhui that experienced an early fertility decline. In 1957 and 1958 grain production was very good, and the government procurement level was moderate. Therefore, the fertility deficit in 1958, and probably in 1959 as well, should not be attributed mainly to food shortages.

Studies of China's seasonal patterns of fertility demonstrate that births occur most frequently in the last several months of the year, with the peak in autumn.[65] Our analysis of the provincial seasonal birth patterns reveals that abnormally low monthly births in late 1958 were responsible for the fertility deficits in Henan and Anhui. Many provinces (e.g., Henan) experienced abnormally low monthly births again in mid-1959.

Remarkable social transformations occurring during that period probably made important contributions to these early fertility declines. In rural areas the

irrigation campaign in the winter of 1957–58, the intensification of the communization movement in the second half of 1958, and the large-scale rural-to-urban migration all interrupted peasant family life. The motto of the day was "Military organization, warlike action, and collective life."[66] Couples were separated, reducing the opportunity for conception and leading to massive fertility declines nine months later. Traditional family care for infants and the elderly was also adversely affected. The incidences of miscarriages, abortion, and excess mortality increased.

Massive excess deaths reportedly occurred in Sichuan Province in 1958. Provincial vital statistics show that the crude death rate rose from 12.07 in 1957 to 25.17 in 1958. The number of registered deaths was about 0.85 million in 1957, but the figure rose to 1.8 million in 1958. Available data suggest that a bumper harvest in 1958 actually increased per capita food grain availability for both agricultural and nonagricultural populations. The provincial average may conceal some local shortages and famines, but such large excess mortality seems out of line with grain data. The cause of the sudden increase in mortality, whether spurious or grounded in unrecorded abnormal conditions, remains unknown. In any event, it is unlikely that this excess mortality in 1958 was caused by the food shortage. The case of Gansu seems to be similar to that of Sichuan.

Fertility response to famine

The demographic impact of famine is frequently assessed in terms of mortality. However, researchers have increasingly recognized the significance of a fertility response to famine. The reasons for famine-induced fertility declines are fairly well analyzed.[67] In the case of China, although the initial fertility deficit was mainly caused by the chaotic events of the Great Leap Forward, the widespread food shortage was undoubtedly responsible for the subsequent massive fertility crisis.

Postponement of marriages has been stressed by several writers as a major factor in the fertility deficit during famine. Our analyses of provincial trends in the total first marriage rate and the mean age at first marriage demonstrate that postponement of marriage occurred in most Chinese provinces immediately after the onset of the food shortage in 1959. Typically the marriage deficit lasted for only a year, however, and was followed by a quick and sharp recovery. By 1961 total first marriage rates had returned to, or even exceeded, the levels recorded during the mid-1950s in most provinces, although the food shortage had reached its most serious level. Even though there was a real postponement of marriage and the single-year marriage deficit in some cases was severe, the overall impact of delayed marriage was very small for the period 1959–61 as a whole.

No satisfactory data exist on divorce during the period under consideration. But we know that in Gansu Province the divorce rate rose sharply during the crisis period, especially in rural areas. It is estimated that about 30–40 percent, and in some places even 60 percent, of the divorces in Gansu were

caused by the famine.[68] The situation in other provinces is believed to have been similar. Moreover, separations must have occurred when one partner migrated to find work and food for the family. Interprovincial migration occurred on a very large scale, sometimes involving millions of people in a single year. For example, net inmigrants to Neimonggu reportedly totaled more than one million in 1960. By contrast, Shandong lost 1.6 million people to outmigration in 1960.[69] Women accounted for a sizable proportion of this movement. Reportedly two-fifths of the migrants to Gansu during the first nine months of 1961 were women. This female outmigration created social problems: after the crisis, local governments signed agreements to send married women back to their husbands.[70] Thus, famine-induced separation was one of the causes of the fertility deficit.

Our analysis also shows that higher order births were more likely to have been postponed than other births. Compared with the reference years, the national figure for first birth intervals increased by 12 percent and that for second birth intervals by 28 percent. Some studies also suggest that during the crisis, progression to higher order births declined more than progression to lower order births.[71] Apart from biological reasons, this pattern may also result from the fact that newly married couples were less likely than long-married couples to accept abstinence or abortion voluntarily.

Consumption patterns and excess mortality

The magnitude of excess mortality is closely connected with the severity of food shortage. However, the data in Table 3 and other provincial data on per capita grain output suggest that low yearly grain availability or consumption did not invariably lead to excess deaths. Grain availability for the agricultural population in Hebei Province during the crisis was as limited as in Sichuan and Henan, but the extent of excess deaths in the former was much smaller than in the latter two provinces. Moreover, the largest excess mortality did not always occur at the time of worst grain supply. For instance, in Henan grain availability reached its nadir for both rural and urban populations in 1961, but the crude death rate in that year was normal. The situation in Jiangsu, and probably in Sichuan as well, was similar.

It is also interesting to note that grain supply in 1962 did not improve substantially and was still much lower than the pre-Leap level in almost all provinces; however, fertility recovered considerably, and a baby boom was in the making. Levels of mortality, as measured by the crude death rate, returned to normal. In many provinces crude death rates in 1962 fell below the pre-Leap levels. These anomalies suggest that many factors other than famine were responsible for the crisis.

A major change in consumption patterns is probably one of the most important factors. This change was another consequence of the Leap. With the establishment of the people's communes in late 1958, rural community dining rooms, or public mess halls, were established throughout the country. The primary aim of the mess halls was to liberate female labor from housework,

thereby diverting it to productive activities. In addition, the promotion of mess halls marked the first effort to organize collective consumption, which was described as a step toward a true communist society.[72] Food was to be managed and distributed not by the household but by the community. In other words, food provision and consumption were centralized.

Mess halls brought great changes in the peasants' grain consumption. Chinese peasants had struggled for food for centuries. Even in 1987, according to the government, there were 40 million peasants living at subsistence levels, which means they are still trying to solve the problem of getting enough to eat.[73] In most periods peasant households have had to plan their yearly grain consumption carefully according to the harvest, frequently finding substitute foods, such as vegetables, potatoes, and gourds. This situation was suddenly changed by the establishment of mess halls. Free supply of foodgrains to commune members was widely accepted as a major portion—usually 70–80 percent—of the commune's wage system.[74] The slogan then was "Eat as much as you like, and do as much as you can." Mess halls were praised by the peasants as "iron rice bowls." As the age-old fear of famine seemed to have vanished, overconsumption became a common feature of the mess halls. The logic was very simple, since the commune promised to provide food for every member.

It was said that in some rural areas the grain consumed by peasants in a three-month period amounted to what usually sufficed for six months. According to an estimate prepared by the Chinese economist Xue Muqiao, in the first year of the communization movement the overconsumption of grain among China's rural population amounted to about 17.5 million tons,[75] equivalent to 8.75 percent of the total grain output in 1958. The mess hall was a new phenomenon in China's countryside, and mismanagement at the early stage was inevitable. Nevertheless, overconsumption, along with the concealment of grain output by peasants, which was universally practiced at that time,[76] should be seen not as peasant greed or selfishness, but as a form of active resistance to, and self-preservation in the face of, high procurement levels.

The commune mess halls were short-lived. But by mid-1960, 99 percent of peasant households in Henan and 94 percent in Guizhou were still eating in such halls.[77] Ironically, almost all the provinces that were praised by a *People's Daily* article for their "good performance" in establishing rural mess halls experienced severe excess mortality.[78]

In many marginal areas peasants were accustomed to consuming less grain in the slack season in order to have enough for the busy seasons. With the progress of the Leap, large squads of rural laborers were organized by the commune to undertake water conservation, road building, and steel melting. Since much of this work involved heavy physical labor and was conducted in the winter, which was traditionally the slack season, the old consumption pattern was broken. Although peasants who worked on those projects could obtain some grain subsidies from the state, the major part of their grain supplies

came from the communes. This certainly led to an increased demand for grain, especially when laborers were given double rations.[79]

In the urban areas control over food rations was relaxed in the early stage of the Leap. Retail sales of grain to the urban residents in the first eight months of 1959 were reported to be 13.6 percent higher than those for the same period in 1958.[80] Urban residents might have used some of that grain to help their rural relatives. Nevertheless, it was estimated that about 5 million tons of grain was overconsumed by the urban population. Together with grain that was overallocated for seeds—another consequence of mismanagement[81]—the total volume of overused grain in the first year of the Leap amounted to more than 32.5 million tons, or about 16 percent of that year's total grain output.[82]

The change in consumption patterns obviously aggravated the grain problem. Thus, in China famine occurred not only because of entitlement failure, but also because of failure in consumption arrangements.

Rectification

By late 1958 the policy errors were recognized by some government officials. However, although minor policy adjustments were made, the seriousness of the situation did not receive adequate attention. The general political atmosphere of the time was still infused with Leap fever, which reached a new peak after the Lushan Conference in August 1959. The Soviet Union broke off relations with China in the summer of 1960, provoking nationalist sentiment and giving the Leap a new stimulus.[83] When the serious mistakes and grave consequences of the Leap were at last recognized, a policy of adjustment was set forth in September 1960. Not until late 1961, however, was the adjustment implemented in earnest.

Since the major cause of the disaster was policy error, the principal aim of the adjustment was to make necessary institutional and economic changes. Several strict measures were adopted. The urban population and the labor force employed by the state were greatly reduced. Most of the newly recruited rural labor force was sent back to the countryside. Many industrial projects and some water conservation projects were cut back. The government's grain procurement program was considerably reduced, and a large amount of grain was imported from abroad. Within the newly established communes, the basic accounting unit was shifted down to the production team, and the public mess halls were closed.[84]

No direct large-scale famine relief operation was undertaken, since the problem was so widespread that disaster relief would have put tremendous strain on already overextended state resources. Instead, the government removed the barriers to agricultural production and let the peasants help themselves. From a demographic viewpoint, this measure worked very successfully. Although agricultural production recovered slowly and the grain supply did not return to the pre-Leap level until 1965, mortality returned to normal levels

soon after this measure was implemented, and an unprecedented fertility boom followed in 1963. This would seem to confirm that the demographic crisis during the Great Leap period was mainly caused by erroneous government policy decisions (on top of natural disasters), as well as by hastily introduced institutional changes and innovations for which China was ill prepared.

Appendix: Sources of data

Provincial fertility data were taken from China's 1982 One-Per-Thousand-Population Fertility Survey. Data on provincial grain-sown areas, unless otherwise specified, are from confidential sources (data not officially published in China).

China

Statistical Yearbook of China, 1983 (Beijing, 1983).

Beijing

Data on population, mortality: *Population Monographs—Beijing*, forthcoming; grain output: confidential, adjusted for change in administrative territories.

Tianjin

Population: *Statistics of Tianjin's National Economy, 1949–1980*; mortality: *An Economic Survey of Tianjin*, 1984; grain output: confidential.

Hebei

Population, mortality, grain output, grain procurement: *Statistical Yearbook of Hebei's Economy, 1985*; retail grain sales: confidential, adjusted for change in administrative territories.

Shanxi

Population, grain output, grain procurement: *Statistical Yearbook of Shanxi, 1985*; mortality: *Population Monographs—Shanxi*, forthcoming.

Neimonggu

Population, mortality: *Statistical Yearbook of Neimonggu, 1984*; grain output: confidential.

Liaoning

Population, mortality, grain output: *Statistical Yearbook of Liaoning's Economy, 1984*; grain procurement, retail grain sales: confidential.

Jilin

Population, mortality, grain output: *The Great Achievements in Jilin's Socialist Construction in the Past 35 Years*, 1984.

Heilongjiang

Population, mortality, grain procurement, grain output: *Development in Heilongjiang, 1949–1983*, 1984.

Shanghai

Population, mortality, grain output, grain-sown areas: *Statistical Yearbook of Shanghai, 1983*.

Jiangsu

Population, grain output: *Statistical Yearbook of Jiangsu, 1985*; mortality: *Population Monographs—Jiangsu*, forthcoming; grain procurement, retail grain sales: confidential.

Zhejiang

Population, mortality: *Statistical Yearbook of Zhejiang, 1984*; grain output: *Yearbook of Zhejiang's Rural Economy, 1985*.

Anhui

Population, grain output, grain procurement: *Statistical Yearbook of Anhui, 1984*; retail grain sales: confidential.

Shandong

Population, mortality, grain output: *Statistical Yearbook of Shandong, 1983*.

Fujian

Grain output, grain procurement: *Yearbook of Fujian, 1984*.

Jiangxi
Grain output: confidential.
Henan
Population: *Yearbook of Henan, 1984*; mortality, grain output, grain procurement, retail grain sales: *Statistical Abstract of Henan's National Economy, 1949–1978.*
Hubei
Grain output: confidential.
Hunan
Population, grain output: *Statistical Yearbook of Hunan, 1983*; mortality: *Population Monographs—Hunan,* forthcoming.
Guangdong
Mortality: *Analysis and Projection of Guangdong's Population*, 1985; grain output: confidential.
Guanxi
Grain output, grain procurement, retail grain sales: confidential; mortality: data for Fangcheng County, *Collection of Demographic Essays on Minority Populations.*
Sichuan
Population, mortality: *Population Monographs—Sichuan*, forthcoming; grain output, grain procurement, retail grain sales, grain-sown areas: *A General Survey of Sichuan Province*, 1985.
Guizhou
Population, mortality, grain output, grain procurement, grain-sown areas: *Economic Handbook of Guizhou*, 1984.
Yunnan
Mortality: *Statistical Abstract of National Economy in Yunnan, 1949–1983*, 1984; grain output, grain procurement, retail grain sales: confidential.
Gansu
Population, mortality: *Population Monographs—Gansu*, forthcoming; grain output: confidential, adjusted for change in administrative territories.
Ningxia
Mortality: *Population Geography of China*, 1986; grain output: confidential, adjusted for change in administrative territories.
Xinjiang
Mortality: *Population Geography of China*, 1986.
Shaanxi
Grain output: confidential.
Qinghai
Population, grain output: "Analysis of the relationship between population growth and grain production," *Northwest Population* (March 1984).

Notes

This paper was initially presented at a Food and Agriculture Organization Expert Consultation on Population and Agricultural and Rural Development, Rome, 29 June–1 July 1987. Financial support from the Population Council and FAO is acknowledged. The author is deeply indebted to John Hobcraft for his great help in the preparation of this paper. Thanks are due to William Lavely for encouragement and valuable comments on an earlier draft.

1 Such as the Hangzhou Conference in January, the Nanning Conference in February, and the Chengdu Conference in March.

2 See "Several major issues in current capital construction work," in *Chen Yun's Strategy for China's Development,* ed. N. Lardy and K. Lieberthal (New York: M. E. Sharpe, 1983).

3 Luo Hanxian, *Economic Changes in Rural China* (Beijing: New World Press, 1985).

4 For example, Basil Ashton et al., "Famine in China, 1958–61," *Population and Development Review* 10, no. 4 (December 1984): 613–645.

5 Judith Banister, *China's Changing Population* (Stanford, Calif.: Stanford University Press, 1987), pp. 83–85.

6 See Wang Weizhi, "The preliminary analysis on China's death rate," paper presented at the International Seminar on China's 1982 Population Census, Beijing, 1984 (in Chinese).

7 State Statistical Bureau, *Statistical Yearbook of China, 1983* (Beijing, 1983).

8 John Bongaarts and Mead Cain, "Demographic responses to famine," in *Famine*, ed. Kevin M. Cahill (Maryknoll, N.Y.: Orbis Books, 1982).

9 For example, Ansley J. Coale, *Rapid Population Change in China, 1952–1982*, National Research Council, Committee on Population and Demography, Report No. 27 (Washington, D.C.: National Academy Press, 1984); Judith Banister, "An analysis of recent data on the population of China," *Population and Development Review* 10, no. 2 (June 1984): 241–271; G. Calot, "Some suggestions aimed at facilitating the analysis of China's population statistics," paper presented at the IUSSP Conference, Florence, 1985.

10 Completeness of reporting for this period was estimated by Banister to be 84.1 percent for births and 64.1 percent for deaths; Calot's estimates were 85.4 percent for births and 61 percent for deaths (excluding 1959); Coale's figures were 84.3 percent and 62 percent respectively (all three sources as cited in note 9).

11 *Chinese Population Monographs—Hunan* (Hunan, forthcoming; in Chinese).

12 Bongaarts and Cain, cited in note 8.

13 Wu Huanyong and Zhang Shanyu, *Population Geography of China* (Shanghai, 1986; in Chinese).

14 *Population Geography of China*, cited in note 13. Jiangxi's crude death rate in 1961 was reportedly 11.7 per thousand.

15 *Population Geography of China*, cited in note 13.

16 The crude death rate in Zhejiang, for instance, was reported as 12.77 per thousand in 1961.

17 See Ashton et al., cited in note 4.

18 See Ansley J. Coale, "Population trends, population policy, and population studies in China," *Population and Development Review* 7, no. 1 (March 1981): 85–97; and Ashton et al., cited in note 4.

19 See the Appendix for sources of data.

20 Statisticians and demographers in China's State Statistical Bureau and Family Planning Commission are working on this subject.

21 Amartya Sen, *Poverty and Famines: An Essay on Entitlement and Deprivation* (New York: Oxford University Press, 1981). Entitlement here refers to the individual's ability to command food and the means of obtaining it that are legitimized by the legal system operating in the society.

22 Vaclav Smil, "China's food: Availability, requirements, composition, prospects," *Food Policy* 6, no. 2 (May 1981): 67–77.

23 Elisabeth Croll, *The Family Rice Bowl: Food and the Domestic Economy in China* (London: Zed Press, 1983).

24 *Statistical Yearbook of China, 1983*, cited in note 7.

25 Sources of data on provincial grain production can be found in the Appendix.

26 See Walter Mallory, *China: Land of Famine* (New York: American Geographical Society, 1926).

27 See *People's Daily*, 23 December 1959; Hong Kong *Ta Gong Bao*, 30 December 1960; and *Yearly Charts of Dryness/Wetness in China for the Last 500-year Period* (Beijing, 1981; in Chinese).

28 *Statistical Yearbook of China, 1983*, cited in note 7.

29 Ibid.

30 Ibid.

31 Sources of data on provincial grain-sown areas can be found in the Appendix.

32 Xue Muqiao, "Review of the economic work in the past twenty years in accordance with practical experience," *Selected*

Economic Essays of Xue Muqiao (Beijing, 1984), p. 174 (in Chinese).

33 See M. Schoenhals, *Saltationist Socialism: Mao Zedong and the Great Leap Forward 1958* (Stockholm, 1987).

34 See R. MacFarquhar, *The Origins of the Cultural Revolution*, Vol. 2: *The Great Leap Forward 1958–1960* (New York: Oxford University Press, 1983).

35 *The Great Leap Forward 1958–1960*, cited in note 34.

36 Xu Lihua, "Reduce workers and the urban population," in *Recalling the Adjustment of the National Economy in the 1960s* (Beijing, 1981), pp. 123–137 (in Chinese).

37 For example, *Anhui Daily*, 18 July 1959.

38 See Xue Muqiao, "China's economy in retrospect and prospects," in *Economic Reform in the PRC*, ed. and trans. by G. C. Wang (Boulder, Colo.: Westview Press, 1982).

39 Kenneth Walker, *Food Grain Procurement and Consumption in China* (London: Cambridge University Press, 1984).

40 Walker, cited in note 39.

41 *Statistical Yearbook of China, 1983*, cited in note 7.

42 Mao Zedong, "Speeches at the Zhengzhou Conference (February–March 1959)," in *Long Live Mao Zedong Thought* (Hong Kong, 1975), pp. 8–49 (in Chinese).

43 *Statistical Yearbook of China, 1983*, cited in note 7.

44 *A General Survey of Sichuan Province* (Chengdu, 1984; in Chinese).

45 See Sun Xueweng and Liu Zhongshi, "The structural economic reform during the period of the Great Leap Forward," in *The Structural Economic Reform in Contemporary China* (Beijing, 1984), pp. 64–93 (in Chinese).

46 Sun Xueweng and Liu Zhongshi, cited in note 45.

47 For example, see *Anhui Daily*, 31 August 1959; *Chongging Daily*, 30 September 1960.

48 Xu Lihua, cited in note 36.

49 T. B. Weins, "Agricultural statistics in the People's Republic of China," in *Quantitative Measures of China's Economic Output*, ed. A. Eckstein (Ann Arbor: University of Michigan Press, 1980).

50 See, for example, *Da Gong Bao*, 9 August 1959.

51 *Liangshi Bao*, 7 December 1959, Beijing.

52 *A General Survey of Sichuan Province*, cited in note 44.

53 See *Development in Heilongjiang: 1949–1983* (Haerbin, 1984; in Chinese).

54 Xue Muqiao, cited in note 38.

55 Thomas P. Bernstein, "Stalinism, famine, and Chinese peasant: Grain procurement during the Great Leap Forward," *Theory and Society* 13, no. 3 (May 1984): 339–377.

56 Sen, cited in note 21.

57 Croll, cited in note 23.

58 Wang Ping, "People's living standard during the period of the Great Leap Forward and adjustment," in *Recalling the Adjustment of the National Economy in the 1960s*, cited in note 36, pp. 162–178.

59 *Collection of Data on Peasants' Income and Consumption for Provinces, Autonomous Regions and Major Cities* (Beijing, 1985), p. 89 (in Chinese).

60 Wang Ping, cited in note 58.

61 In general, the nonagricultural population in China is similar to the urban population. The difference is that the former includes persons who do not reside in the urban areas but who receive commercial grain supply, whereas the latter refers to all persons who live in the urban areas. For detailed discussion, see *Population Geography of China*, cited in note 13.

62 Grain output is measured in terms of unprocessed grain. But procurement and retail sales of grain are based on trade grain, which means that unhusked rice and millet have been converted into husked forms according to standard conversion factors while other grain remains in its unprocessed form. A breakdown of grain output by foodstuffs is not available at the provincial level. In this article, a unified discount rate of 0.83 is used based on national

data: 100 kg. of unhusked grain is equivalent to 83 kg. of trade grain.

63 Wu Qungan, "Historical lessons from the Great Leap and the adjustment," in *Recalling the Adjustment of the National Economy in the 1960s,* cited in note 36, p. 34.

64 Bongaarts and Cain, cited in note 8.

65 Guo Nianlan and Li Keqin, "Time distribution of births," *Population and Economics* (Beijing, Special Issue, 1983; in Chinese).

66 Wei Daonan and Zhang Siqian, "The characteristics and shortcomings of the unitary system of people's communes," in *The Structural Economic Reform in Contemporary China,* cited in note 45, pp. 258–261.

67 G. Hugo, "The demographic impact of famine: A review," in *Famine as a Geographical Phenomenon,* ed. B. Currey and G. Hugo (Dordrecht: D. Reidel Publishing Company, 1984).

68 *Chinese Population Monographs—Gansu,* chapter 11 (Gansu, forthcoming; in Chinese).

69 Estimated from data in *Statistical Yearbook of Shandong, 1983* (Jining, 1984).

70 *Chinese Population Monographs—Gansu,* cited in note 68.

71 For example, G. Feeney and Jingyuan Yu, "Period parity progression measures of fertility in China," *Population Studies* 41, no. 1 (March 1987): 77–102.

72 MacFarquhar, cited in note 34.

73 See *People's Daily,* 21 September 1987.

74 Wei Daonan and Zhang Siqian, cited in note 66; *Anhui Daily,* 10 November 1959.

75 Xue Muqiao, "Lessons from last year's Great Leap Forward [1959]," in *Selected Economic Essays of Xue Muqiao,* cited in note 32.

76 Xue Muqiao, "Review of the economic work in the past twenty years . . . ," cited in note 32.

77 *Henan Daily,* 18 March and 13 April 1960.

78 *People's Daily,* 23 September 1959. The following provinces were praised: Sichuan, Anhui, Henan, Hunan, Yunnan, and Guizhou.

79 See Walker, cited in note 39.

80 See *Anhui Daily,* 20 July 1959.

81 Xie Duyang, "Recalling the agricultural adjustment in the early 1960s," in *Recalling the Adjustment of the National Economy in the 1960s,* cited in note 36, p. 53.

82 Xue Muqiao, cited in note 75.

83 Bo Yibo, "Several issues on economic work," in *China's Socialist Economic Construction* (Beijing, 1980), pp. 1–62 (in Chinese).

84 For detailed discussion, see *Recalling the Adjustment of the National Economy in the 1960s,* cited in note 36.