The Demography of China’s 1958-61 Great Famine: A Closer Examination

Z. Zhao and A. Reimondos

Abstract

One of the largest famines in human history took place in China half a century ago. This disaster, lasting from 1958 to 1961 in many areas, resulted in a huge number of excess deaths. While the causes, magnitude and profound impacts of this catastrophe have been unfolded gradually in recent decades, many issues about the famine remain to be adequately examined.

This paper aims to fill some gaps in our knowledge about the demography of China’s great famine. It concentrates on demographic consequences of and people’s demographic responses to the famine in some of the most severely affected provinces. Through analyzing demographic data collected by China’s 1982 and 1988 national fertility sample surveys, the study provides further insights on changes in marriage, mortality, fertility and pregnancy outcomes during the famine period.

The study shows that the famine already started in 1958. There were a great increase in mortality and decrease in marriage and fertility during the famine period, which had a significant impact on Chinese population. Remarkable differences, however, existed in demographic consequences of the famine between urban and rural areas and in demographic responses between people with different social and demographic characteristics. These findings are very important in improving our understanding of people’s demographic behaviour in the past.
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One of the largest famines in human history took place in China half a century ago. This disaster, lasting from 1958 to 1961 in many areas, resulted in a huge number of excess deaths. While the causes, magnitude and profound impacts of this catastrophe have been unfolded gradually in recent decades, many issues about the famine remain to be adequately examined (Ashton et al. 1984; Banister 1987; Peng 1987; Kane 1988; Jowett 1991; Li 1997; Riskin 1998; Chang and Wen 1998; Yang and Su 1998; Lin and Yang 1998; Kung and Lin 2003; Cao 2005; Fan and Meng 2005; Yang 2008; Houser et al. 2009). This paper, through further analysing data collected by China’s 1982 and 1988 fertility surveys, investigates demographic consequences of and people’s demographic responses to the famine in some of China’s most severely famine-hit provinces.

1. Demographic consequences of and demographic responses to China’s 1958-61 famine: What do we know?

While China’s great famine is often called ‘three years of natural disasters’, a notable decrease in per capita grain output and a marked increase in mortality had already recorded in several provinces in 1958 (Peng 1987; Johnson 1998; Riskin 1998). In that year, officially reported crude death rate was already higher than that for 1956 and 1957 even at national level. By 1959, the famine spread widely throughout the country, and the situation deteriorated further in 1960 (Huang and Liu 1995). Although a sign of improvement was seen in some places in 1961 when China’s recorded population size was still smaller than that for 1958, a full recovery did not begin until 1962.1

We have known that this great tragedy was largely a result of policy failure and mismanagement, although it was exacerbated by poor weather conditions in many areas (Peng 1987; Kane 1988; Li 1997; Chang and Wen 1998; Lin and Yang 1998; Yang and Su 1998; Kung and Lin 2003; Cao 2005; Yang 2008; Houser et al. 2009). The famine took place in an unprecedented scale and showed remarkable regional, including urban-rural, variations. Crude death rate in the worst-hit province was ten times higher than in less affected places. Severe food shortage and its consequences generally were more devastating in countryside than in cities. The great impact of this famine, which has profoundly affected China’s political, social, economic and demographic changes in the last half century, can still be felt today (Song 2009).

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1 According to officially released statistics, China’s population reached 660 million at the end of 1958 while it was 659 million at the end of 1961. It is noticeable, however, that there are inconsistencies in government reported population growth rates and these population totals. For details see Yao and Yin (1994).
We have known that the widespread starvation and significant reduction in calories intake during the famine had a devastating impact on population health and led to a sharp increase in mortality (Peng 1987; Kane 1988; Jowett 1991; Houser et al. 2009). Officially reported crude death rates rose from 10.8 per thousand in 1957 to 25.4 per thousand in 1960 (Huang and Liu 1995). In many counties, the crude death rate reached more than 100 per thousand (Li 1998). Independent estimates made by various scholars revealed a greater increase in mortality. According to some studies, the famine was directly responsible for around 30 millions excess deaths (Coale 1984; Banister 1987; Jin 1993; Kane 1993; Cao 2005).

The famine also resulted in a huge fertility reduction. China’s crude birth rate was 34.0 per thousand population and total fertility rate was 6.4 children per woman in 1957, but they fell drastically to 18.2 per thousand and 3.3 children respectively by 1961 (Yao and Yin 1994). Available statistics implied that fertility decline during 1959-1961 led to a reduction of 15 to 30 million births than otherwise (Ashton et al. 1984; Li 1998; Cai and Wang 2009). Because of the mortality surge and fertility plummet, China recorded its only negative population growth since the founding of the People’s Republic in 1949.

Marked regional variations in the severity of starvation triggered a considerable amount of migration during and after the famine (Peng 1987; Kane 1988). Even according to government records, which are likely incomplete, net population losses caused by migration alone reached 2.6 percent in Anhui, 2.1 percent in Shandong and 1.5 percent in Hunan in 1960 (Zhuang 1994).

The famine also caused great distress in many families or destroyed their family life completely. In addition to many widows, widowers, single parent households or orphans produced by the severe mortality, divorce and family division increased markedly during the famine at least in some areas (Peng 1987). These and under extreme circumstances selling children or wives, were used as a desperate means to prevent some family members from starvation and dying (Yang 2008).

It is easy to note that the discussion presented up to this point and also most available studies of the famine have been based largely on statistics aggregated at national, provincial and in some rare cases county levels. They tend to concentrate more on causes, consequences and impacts of the famine rather than on people’s demographic responses to this disaster. Many questions about the famine remain to be adequately answered.

For example, we have known short-term demographic consequences of the famine reasonably well, those observed at national or provincial level in particular. But our knowledge of long-term demographic impacts of the famine is limited, although a few studies, which largely focus on the long-term health impact of the famine, have been published in the last couple of years (Chen and Zhou 2007; Song et al. 2009; Wang et al. 2009). We know the famine having resulted in a huge loss of lives, but we do not have good knowledge on how did mortality vary among people with different socio-economic

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2 The large difference in estimated numbers of postponed or lost births is a result of different data and assumptions used in the estimation. See also Cai and Wang (2009) and Li (1998).
characteristics during the time of famine, except some limited observations on urban-rural mortality differentials made at national and provincial levels. We know that fertility fell sharply during the famine period, but we do not know the extent to which this reduction was caused by deliberate fertility control rather than being affected by other changes such as hunger resulted poor health, famine induced infertility, separation between spouses, or postponement of marriage (Jowett 1991). Moreover, if intentional fertility control did exist, what kind of women or parents under what circumstances were more likely to have delayed or stopped their childbearing? Briefly, while we have reached some conclusions about the famine with reasonable confidence, detailed demographic evidence that would provide stronger support for these conclusions and further enrich our knowledge about the famine is still limited. Although a number of researchers have recently studied some of the issues discussed above (Cai and Wang 2009; Song 2009), investigations specially designed to examine these questions are still difficult to find.

2. Research questions, data and methods

This paper aims to fill some gaps in our knowledge about the demography of China’s great famine. The study, through analyzing demographic data collected from millions of people, intends to provide further insights on changes in marriage, mortality, fertility and pregnancy outcomes during the famine period. The investigation is directed to the demographic impact of the famine at the level of individuals, especially its variations across different population groups and variations in people’s demographic responses to the famine. The impact of famine on migration and household composition will not be examined in this paper because of the restriction of data availability.

This study uses data collected by China’s 1982 National One-Per-Thousand Population Sample Survey on Fertility and 1988 National Sample Survey on Fertility and Contraception. The first survey employed stratified, clustered, proportional sampling design. It surveyed more than 310,000 women who were aged between 15 and 67 in 1982 and lived in 28 provinces, autonomous regions and metropolitan areas administered directly by the central government. The second survey, which used stratified, systematic, clustered, non-proportional sampling procedure, was conducted in about two-per-thousand of the national population selected from all provinces in mainland China. It, therefore, has also been referred to as 1988 Two-Per-Thousand Fertility Survey. This survey interviewed nearly half million ever married women who were aged 15 to 57 in 1988.

Both surveys obtained detailed information about fertility history for ever married women. The 1982 survey recorded all children for selected women and the surviving status of these children at the time of the survey. The total number of reported children was just over 830,000. The 1988 survey recorded every pregnancy and its outcome for ever married women. It also provided information on surviving status of recorded children and date of death if they had died before the survey was taken. The total number of pregnancies recorded by this survey was around 1.5 million. In addition, the two surveys collected other useful information such as age at first marriage, educational level,
occupation, area of residence, age at menarche and duration of breastfeeding for all selected women (the last two items were included in only the 1988 survey).

Since a considerable number of surveyed women experienced the 1959-1961 famine and many of their children were born in this period, the survey data offer a unique opportunity for an in-depth study of the demography of China’s great famine. These data are free from the impact of deliberate cover-up, which was widely observed in some other data sources both at the time of or after the famine.

Data collected through retrospective surveys may be affected by recall errors and some children may have been missed out in the enumeration. Such impact is likely to be small or negligible. Many studies have shown that the quality of the two fertility surveys is high (Coale 1984; Wang 2002).

When the data are used in the investigation of the demographic consequences of the famine, however, the study can be affected by certain types of selection biases. Such biases arise from systematic differences in mortality and fertility between families where at least a woman survived to the time of the survey and those where all women of the same birth cohorts had died before the survey. Because the fertility of recorded women is likely to have been higher than those who did not live to the time of enumeration, and the survival of children may be related to that of their mothers, during the famine in particular, results obtained from the survey data may not represent what actually happened in the whole population over the famine period. These results however are probably among the most reliable quantitative evidence we can get. They can be used as the low estimates of mortality and fertility impact of the famine for the study areas.

Also, because of the retrospective nature of the surveys, information about women’s education, occupation, place of residence and some other characteristics reflects the situation of the respondents at the time of enumeration, which may not be the same as that at the time of the famine or the time when certain demographic events took place. This could affect of the accuracy of the result when the association between these factors and past demographic changes is examined. Before 1988 when the second survey was undertaken, changes in women’s education, occupation, and urban or rural residential status were relatively small after their marriage, in many rural areas in particular. The impact of such changing status on our study, for this reason, is expected to be relatively small.

Another concern of the study is the sample size. While the two surveys are among the largest fertility surveys ever conducted, when the sampled population is divided by provinces, cohorts or years when a certain demographic event taking place, the number of people in each sub-group is still relatively small. When marriage or fertility patterns of the early years are examined, women included in the surveys, especially the 1988 survey, can only provide a representative sample for women of a limited age range. This is a major reason why data collected by both fertility surveys were examined in the study and why only women of certain age groups were included in some analyses.
This study, instead of investigating their national patterns, examines demographic consequences of and people’s demographic responses to the famine in Anhui, Gansu, Guizhou, Henan, Qinghai and Sichuan provinces. As indicated by Table 1, these six provinces had more than a quarter of the national population at the time and were mostly affected by the famine according to officially reported crude death rates. In comparison with that recorded in 1957, mortality in the national population increased by 135 percent in 1960. In contrast, mortality in the six selected provinces increased by 235 percent (Henan) to 645 percent (Anhui). This conclusion is largely consistent with the comparison made by Peng (1987) and Houser et al. (2009). The decision of selecting these six provinces arises mainly from the consideration that demographic impacts of and people’s demographic responses to the famine would be more observable under severe famine conditions.

Table 1 Population size and crude death rates in six provinces in selected years

<table>
<thead>
<tr>
<th>Provinces</th>
<th>Population (1000)</th>
<th>Crude death rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anhui</td>
<td>30044</td>
<td>31242</td>
</tr>
<tr>
<td>Gansu</td>
<td>12404</td>
<td>12631</td>
</tr>
<tr>
<td>Guizhou</td>
<td>14514</td>
<td>17141</td>
</tr>
<tr>
<td>Henan</td>
<td>43785</td>
<td>50326</td>
</tr>
<tr>
<td>Qinghai</td>
<td>1229</td>
<td>2146</td>
</tr>
<tr>
<td>Sichuan</td>
<td>61009</td>
<td>67956</td>
</tr>
<tr>
<td>China</td>
<td>567447</td>
<td>694582</td>
</tr>
</tbody>
</table>

Sources: Fan (1995) and Yao and Yin (1994).
Note: There were some changes in provincial territory between 1953 and 1964.

Both conventional and non-conventional demographic methods are used in this study to compute major fertility, mortality and marriage statistics from the data collected by the two fertility surveys. In addition, regression analysis is used to examine differences in fertility, mortality and marriage patterns among various population groups and major factors that associate closely with such variations.

3. Marriage

In this section, changes in marriage patterns are investigated through examining proportions getting married in selected age groups during the study year among women who did not marry at the beginning of the year and proportions of ever-married by a given age. In calculating these statistics, women’s age at the end of the year is used for the convenience of discussion. These indicators have been chosen because they are more revealing in showing the impact of the famine than other measurements, for example Total First Marriage Rate.

3 There were some changes in provincial territories between 1953 and 1964. The difference between the two sets of population figures was partly affected by these changes.
Universal marriage was widely observed among Chinese women in the past. Before 1970, age at first marriage was relatively low and around 95 percent of women would have married by age 25. A major impact of China’s great famine was to make marriage more difficult, and for that reason a large number of people postponed their marriage during this period. This is evident in Figure 1, showing proportions of getting married in various age groups among women who did not marry at the beginning of the year over the period 1956 to 1965. This and next figure present only the results obtained through the 1988 fertility survey, and the results of the 1982 fertility show very similar patterns.

Figure 1  Proportion getting married for women of selected ages, 1956-1965

According to Figure 1, changes in the proportion of women getting married among those who were aged 15 and 16 were relatively small before 1963, including the famine period. This was likely due to the fact that those marrying at these young ages were affected more by the tradition of early marriage, and thus maintained a relatively strong propensity to marry even in the time of hardship. In other age groups, changes in marriage behaviour were more observable during and after the famine. In 1958, proportions of getting married in many age groups already started to fall. This was more notable in Anhui, Gansu and Sichuan provinces. Such a downturn trend continued in 1959, when proportions getting married in most of the listed age groups reached the lowest level in the study period. In 1960, the proportions remained low in most age groups although they were higher than those recorded in 1959 in a few age groups. In comparison with that revealed by the Total First Marriage Rate which had already reached its pre-famine level in the six provinces in 1960, this analysis suggests that the impact of famine on people’s marriage behaviour was more severe and lasted for a longer period. Proportions getting married recovered to their 1957 levels in most age groups in 1961. They continued to rise and reached a new height in 1962 and 1963, because women who could not marry during the famine while they were young now married at slightly older ages.
The above conclusion is supported by Figure 2, displaying the percentage of ever-married by a given age over the period 1956 to 1965. As shown earlier, the impact of famine on those who married before reaching age 17 was small. In contrast, proportions of ever-married women at age 17 to 23 all showed a notable trough in the period 1958 to 1961, which resulted primarily from delaying marriage recorded in many age groups during this time. By 1962 and in some age groups by 1963, the lag impact of the famine on the proportion ever-married became less observable when the cumulated percentages of married women reached their pre-famine levels before they started to decline again in the mid-1960s, which was caused primarily by a further increase in age at marriage.

Figure 2  Proportion of women ever-married by selected ages, 1956-1965

Source: 1988 Fertility Survey

4. Reproductive behaviour and fertility

Remarkable changes also took place in people’s reproductive behaviour and fertility during the famine. One of the most significant changes was the drastic fertility reduction, as already indicated by the national figures cited earlier. This change is further revealed by the decline in Total Marital Fertility Rate (TMFR) and Total Fertility Rate (TFR) for women aged 15 to 24, or truncated TMFR and TFR. To use the truncated TMFR and TFR is again due to the constraint imposed by data availability. While the TMFR and TFR for this age range are markedly lower than, and thus cannot represent, the fertility of women of all reproductive ages, they are very effective in showing the magnitude of fertility decline in comparable age groups over a longer period.

Figure 3 shows TMFRs and TFRs for women aged 15 to 24 in years 1956 to 1965 computed from the 1988 survey data. The 1982 survey results are almost exactly the same and therefore not presented here. Both TMFR and TFR started to decline in the
study population in 1958. Our detailed examination shows that in the second half of 1958, monthly fertility rates among women aged 15 to 24 were already notably lower than those observed in the same months in 1956 and 1957. This suggests that conceptions had already fallen in the last quarter of 1957. An even sharper reduction in the truncated TMFR and TFR was observed in 1959. This trend continued in the next two years. In 1961 the TMFR and TFR reached their lowest levels and were only about 40 percent of those recorded in 1957.

Figure 3 Changes in TFRs and TMFRs for women aged 15 to 24 in years 1956 to 1965

According to these annual fertility indicators, the fertility downturn reversed in 1962, when the TMFR and TFR for women aged 15-24 more than doubled those recorded for 1961 and reached the levels observed in 1958. The monthly data show that marital fertility reached its pre-famine level in the mid-1962, suggesting that conceptions returned to the level recorded in 1956 and 1957 in the second half of 1961, which was very close to the time of a full recovery in marriage. A fertility surge took place in 1963 and both truncated TMFR and TFR reached their record levels. This was partly attributable to the ‘compensation’ effect that women who delayed their reproduction during the famine now speeded up childbearing in order to make up their fertility loss. In 1964 and 1965, the unprecedented fertility fluctuations taking place in the famine and post-famine period ended. The truncated TMFR and TFR fell back to their pre-famine levels.

The great fertility reduction was also revealed by changes in Period Parity Progression Ratio (PPPR), which measures the propensity or level of women having another child after having already had a certain number of children. Figure 4 shows PPPRs for years 1956 to 1965 computed from the 1982 fertility survey. To calculate the PPPR for any year requires information of women’s fertility history of previous ten years. We have chosen to use 1982 survey data, because they provide the required information for
women born in earlier years and therefore are more suitable for the analysis than the 1988 survey data. According to our results, most of the PPPRs already showed a slight decrease in 1958, but the fall was more observable in the next three years. One of the most important findings shown in this figure is that greater reductions in PPPRs were recorded among women who already had a larger number of children. For example, while the progression ratio from parity one to parity two decreased from 0.97 to 0.75, the progression ratio from parity four to parity five fell from 0.90 to 0.52. We have not presented PPPRs for women having already had five or more children in the figure, because of the small number of births used in computing them.

Figure 4 Changes in period parity progression ratios, 1956-1965

During the famine period, changes in fertility behaviour indicated not only by the fall in truncated TMFRs, TFRs and PPPRs, but also by the increase in birth intervals. In comparison with women giving births in the pre-famine period, women who had given birth in famine years (their proportion was already much smaller than those who did that earlier) tended to have a longer birth interval. This was also the case in the few years immediately after the famine, when many women who had postponed childbearing during the famine resumed their reproduction. According to our analysis, the interval between marriage and first birth for women who were aged 15-24 and gave their first birth in the period 1960 to 1964 was longer than that recorded between 1956 and 1959. The interval between the first and the second, and that between the second and the third births for women of the same ages also showed a notable increase over the period 1959 to 1963. In the next two years, these birth intervals fell back to or below their pre-famine levels.

A further observation made through our analysis is the marked variation in changes in reproductive behaviour and fertility among women with different demographic characteristics during the famine and post-famine period. As has already been shown in
Figure 4. When the PPPR declined, the progression ratio for women having already had more children generally fell greater than that for women having had fewer children, which is supported by the national figure published by Feeney and Yu (1987). Furthermore, the change in PPPRs was also related to the sex composition of children that women already had, showing in Figure 5. In the six provinces, the fall in PPPRs among women who already had sons and daughters was generally greater than that for women who had same number of children but with only sons or daughters. This pattern is more observable in our analysis of changes in national fertility patterns, which is based a larger sample and shown in Figure A1 in the appendix, and the conclusion is also supported by other studies (Zhao 1997; Hao and Gao 1997).

Figure 5. Changes in period parity progression ratios by sex composition of children already had, 1956-1965

Source: 1982 Fertility Survey

Differences of the same nature were also observed in the immediate post-famine years. Partly because of a stronger tendency of postponing the birth of next child among women who already had a larger number of children than those who did not, there were also notable variations in changes in birth intervals. For example, the interval from marriage to first birth increased from 2.3 years in 1956 and 1957 to 3.1 years in 1962. In the same period, the intervals from the first to second and from the second to third birth increased from around 2.5 years to about 4 years. It is also notable that in 1962 when the fertility recovery started to accelerate, marital fertility rates for women aged 20 to 24 recovered quicker and reached a relatively high level in comparison with that recorded among women aged 15 to 19.

5. Mortality

While both 1982 and 1988 fertility surveys collected information on mortality, the 1982 survey recorded only survival status of every child at the time of the enumeration. Our
analysis of mortality changes thus has to be based mainly on the examination of mortality data obtained from the 1988 survey. We have compared proportions of children surviving to June 1982 in the sampled populations recorded in the six provinces by the two surveys. The results are very consistent for people born between 1950 and 1970 except that according to the 1988 fertility survey proportions of people who were born in 1951, 1958 and 1961 and survived to June 1982 were 3 to 5 percent higher in comparison with those enumerated by the 1982 survey.

The 1988 survey results show a marked increase in infant and child mortality during the period of famine. As Figure 6 indicates, the infant mortality was around 120 per thousand births in 1956 and 1957. It rose to about 160 per thousand in 1958, and further increased to more than 200 in 1959 and 1960. The infant mortality fell to about 150 per thousand in 1961, which was still higher than the average of 1956 and 1957. Starting from 1962, infant mortality in the study population fell below 100 per thousand.

Figure 6  Changes in infant and child mortality in years 1956 to 1965

![Figure 6](image-url)

Source: 1988 Fertility Survey

Similar changes took place in the probability of dying between age 1 and 4. This probability had already fallen to just above 110 per thousand by 1957 in the six provinces. In 1958 when the famine started, the probability of dying between age 1 and 4 rose sharply to more than 160 per thousand, higher than the level of infant mortality. This probability further increased to more than 170 per thousand when the famine became severer in 1959 and 1960 before falling back to the pre-famine level in 1961. In the next few years, the probability of dying between age 1 and 4 showed a continuous decline. During the period of famine, an increase was also observed in probability of dying

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4 In computing the 4q1 and 5q5, we have first computed 4M1 and 5M5, and then converted them to 4q1 and 5q5. Using different methods to compute the probability of dying at these ages could lead to different results, especially during the time of famine when there were a marked increase in mortality and decrease in fertility.
between age 5 and 9, despite that the level of mortality in this age group was much lower than that under age 5.

As emphasized in the early section, using data collected through retrospective fertility surveys to study mortality changes during the famine could under-estimate the level of mortality because the risk of dying in the family where at least a woman survived from the time of the famine to the year of the survey is very likely to have been lower than that in the family where the women of the same birth cohorts all died in this period. However, even these data show a great increase in mortality during the famine years. A hypothetical birth cohort that experienced the infant and child mortality recorded in 1957 in the six provinces would have 76 percent of its members survived to age 10. But under the mortality observed in 1958, 1959, 1960 and 1961, cohort members who could have done so would fall to 67, 62, 61 and 74 percent, respectively. Under the mortality similar to that recorded in 1960, almost 40 percent of people would die before reaching age 10, which is slightly lower than that given by Coale-Demeny model life table for males, region west, level 7. If mortality levels in other age groups of the study population were also close to those given by this mortality model, then the life expectancy at birth for the population would be around 32 years.

Our analysis of cohort mortality changes further shows that chances of surviving to age 10 were rather low for people born in 1958, 1959 and 1960, between 69 and 73 percent, but the chance was 79 percent for those born in 1961, much higher than that for people born between 1956 and 1960. These results suggest that so far as the six study provinces are concerned, a marked increase in infant and child mortality already took place in 1958, and its level was considerably higher than that recorded in 1961.

Figure 6, which shows probabilities of dying for male and female children, also indicates that sex ratios of infant mortality were greater than 1 in both pre- and post-famine periods, but they were close to or even lower than 1 during the period 1958 to 1961. In 1961 when male infant mortality fell closer to its level of 1957, female infant mortality was still notably higher than four years ago. This seems to have suggested that infant mortality slightly biased toward females during the famine in comparison with the pre-famine period. As for the sex ratio of mortality among children aged 1 to 9, female mortality was higher than that for males in most of the years under observation. This was also notable in the probability of dying between age 1 and 4 in 1959 and 1960, and in the probability of dying between age 5 to 9 in 1958 and 1959. Our analysis of cohort mortality has further shown that while male infant mortality was generally higher than that for females, probability of dying between age 1 and 4 was consistently higher for females than males in the period under observation. Mortality differentials of this kind are most likely to have been related to favourable treatments given to male than female children, which were observed in many historical Chinese populations (Zhao 1997; Lee et al. 1994).

6. Pregnancy outcomes and fertility determinants

In addition to fertility and mortality changes examined in previous sections, levels of stillbirth, spontaneous abortion and induced abortion, patterns of breastfeeding and age at menarche changed notably during the period of famine. Many of these demographic
events are conventionally called as proximate determinants of fertility by demographers because they can directly affect the level of fertility. This section examines these changes on the basis of the outcomes of nearly 50 thousand pregnancies recorded by the 1988 fertility survey among women aged 15 to 29 in the period of 1956 to 1965.

One of the most notable impacts of the famine on pregnancy outcomes was the reduction in the proportion of live births, shown in Table 2. More than 95 percent of recorded pregnancies led to live births before 1958, but they fell to just above 92 percent in 1960 and 1961. The famine triggered not only an increase in infant and child mortality, but also a rise in stillbirths and spontaneous abortions, which was closely related to women’s poor health. According to the survey results, an average of 1.5 percent of pregnancies ended in stillbirths over the periods 1956, 1957 and 1962 to 1965, but it was 1.9, 1.9, 2.4 and 1.7 percent in 1958, 1959, 1960 and 1961, respectively. Similarly, on average 2.7 percent of pregnancies were reportedly terminated by spontaneous abortions in the six pre- or post-famine years specified above, but it rose to 3.2, 3.9, 4.5 and 5.0 percent in the four years affected by the famine, respectively.

Table 2 Percentage distribution of pregnancy outcomes for women aged 15-29, by years

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</tr>
</thead>
<tbody>
<tr>
<td>Live birth</td>
<td>95.2</td>
<td>95.5</td>
<td>94.4</td>
<td>93.5</td>
<td>92.1</td>
<td>92.3</td>
<td>95.4</td>
<td>95.1</td>
<td>94.4</td>
<td>93.8</td>
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<tr>
<td>Stillbirth</td>
<td>1.9</td>
<td>1.5</td>
<td>1.9</td>
<td>1.9</td>
<td>2.4</td>
<td>1.7</td>
<td>1.4</td>
<td>1.5</td>
<td>1.5</td>
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<tr>
<td>Spontaneous abortion</td>
<td>2.8</td>
<td>2.7</td>
<td>3.2</td>
<td>3.9</td>
<td>4.5</td>
<td>5.0</td>
<td>2.9</td>
<td>2.6</td>
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</tr>
<tr>
<td>Induced abortion</td>
<td>0.1</td>
<td>0.3</td>
<td>0.5</td>
<td>0.6</td>
<td>1.0</td>
<td>1.1</td>
<td>0.3</td>
<td>0.8</td>
<td>1.4</td>
<td>2.0</td>
</tr>
<tr>
<td>Sex ratio at birth</td>
<td>108</td>
<td>103</td>
<td>106</td>
<td>110</td>
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<td>117</td>
<td>106</td>
<td>111</td>
<td>107</td>
<td>106</td>
</tr>
</tbody>
</table>

Source: 1988 fertility survey.

Induced abortions also showed a marked increase during the famine though their level was very low because abortion as a means of controlling unwanted births was neither acceptable and nor readily available at the time. Only 0.1 and 0.3 percent of pregnancies were terminated by induced abortion in 1956 and 1957; but it rose to 0.5, 0.6, 1.0 and 1.1 percent in 1958, 1959, 1960 and 1961, respectively. In the next two years, induced abortions fell to 0.3 and 0.8 percent, before they reached 1.4 and 2.0 percent in 1964 and 1965. Since then, induced abortion has increasingly become acceptable and also been used widely to control the number of births in recent family planning program. If changes in the magnitude of stillbirths and spontaneous abortions were largely a result of women’s poor health caused by hunger, the rise and fall in induced abortions were at least partly affected by people’s intention. That people might have deliberately manipulated the pregnancy outcomes was also indicated by changes in reported sex ratio at birth. In comparison with most of the pre- and post-famine years, the ratio of recorded male to female live births increased in the period of the famine, 110 in 1959 and 1960, and 117 in 1961. These ratios were notably higher than what would be expected under normal conditions. Among others, one explanation for this irregular pattern is the
existence of female infanticide or giving girl babies to others for adoption,\(^5\) both of which were found in some historical or even contemporary Chinese populations (Zhao 2006; Lee \textit{et al.} 1994; Johansson and Nygren 1991).

In addition, the famine greatly affected two other proximate determinants of fertility, age at menarche and breastfeeding. The 1988 fertility survey data have revealed that during the famine, physical maturity for many women came later than in normal years. The proportions of women who already had menarche by age 16, 17 or 18 all showed a notable decline over the period 1958 to 1963, indicating that the deterioration of women’s health had already started to affect the time of their menarche from at least 1958. These proportions did not recover to their pre-famine levels until 1964. For example, proportions of women who already had menarche reached 54, 72 and 87 percent among women aged 16, 17 and 18 in 1957. But in 1961 they dropped to their lowest levels recorded over the study period, 43 percent at age 16, 61 percent at age 17, and 78 percent at age 18. Because of this delay, reported mean age of menarche showed a notable increase for women who were born between years 1941 and 1950 and reached age 15 between 1956 and 1965.\(^6\)

In the 1950s and 1960s, the proportion of mothers who breastfed (regardless of its duration) their children was very high, more than 97 percent in the study areas. During the famine years, the proportion of women who reported to have breastfed their newborns decreased slightly, less than two percent, in 1958, 1959 and 1960 in comparison with that recorded either before or after these years. This small change may be interpreted as that at the time of a great food shortage all mothers would breastfeed their children whenever it was possible, although the amount of their milk may be smaller than in normal years. In comparison with women who had breastfed their newborns, the proportion of women who breastfed their children for four or more than four months was lower. They varied between 86 and 90 percent in non-famine years and showed a greater reduction during the period of the famine. Around 87 percent of mothers breastfed their children for at least four months in years 1956 and 1957, but those who did so were only 82 percent in 1959 and 81 percent in 1960. These results were highly consistent with the increase in infant mortality in these years, although they might also result from the poor health of the mothers that prevented them from breastfeeding their children.

7. \textbf{Demographic consequences of and responses to the famine in urban and rural areas}

Having documented marriage, fertility, mortality and other demographic changes over the period of famine, we now turn to another important question – were demographic consequences of and people’s demographic responses to the famine the same in populations living in different areas or with different socio-demographic characteristics?

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\(^5\) Some studies have shown that girls given away at birth were sometimes not reported by their parents, and this contributed to the relatively high reported sex ratio at birth (Johansson and Nygren 1991).

\(^6\) In most surveys conducted in China, retrospective surveys in particular, reported age at menarche tended to be higher than that obtained from other sources or recorded in some other populations. It needs to be interpreted with caution, and deserves a further investigation.
We start with marked differences in such consequences and responses found between urban and rural areas. In conducting this comparative analysis, we have computed monthly marriage, fertility and mortality rates for urban and rural populations, and from which the following observations have been made.

Changes in monthly marriage rates were largely similar in urban and rural areas, as shown in Figure 7. Both urban and rural marriage rates exhibited notable seasonal patterns, with a higher proportion of marrying in winter than in summer months in general. Before the mid-1958, urban and rural marriage rates were close, with urban marriage rates tended to be slightly higher. From the late 1958 to late 1961, urban and rural marriage rates were both affected by the famine, but in urban population marriage rates were somewhat lower than those in rural population in most of the months. These results seem to have suggested that although the rural population was struck harder by the famine, its marriage patterns were less affected than those in the urban population, or that there was a comparatively stronger tendency of postponing marriage in urban areas. After the famine, marriage rates in both urban and rural areas showed a great surge, with rural marriage rates either close to or higher than those for urban areas.

Figure 7 Changes in monthly marriage rates in urban and rural areas

![Graph showing changes in monthly marriage rates](image)

Source: 1988 Fertility Survey

In 1956 and 1957, truncated TFRs and TMFRs recorded among females aged 15 to 24 were also fairly close for urban and rural populations. The urban-rural difference in

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7 Methods used in computing monthly marriage or fertility rates shown in figures 7 and 8 are similar to the methods of calculating the total first marriage rate or total fertility rate. Adding the 12 monthly rates calculated for a year together will be very close to that computed annually.

8 According to the graph, there was a notable spike in fertility in the late 1957. This was caused largely by a problem in data collection and data entry. In conducting the 1988 fertility survey, if respondents reported their month and year of birth according to traditional Chinese calendar, they would be converted into the modern or western calendar according to some rules. The impact of such conversions on computing annual
marital fertility started to emerge in the early 1958. In comparison with what happened in urban areas, fertility in rural areas was affected more severely by the famine and with a greater reduction. As Figure 8 shows, a decline in marital fertility was already noted in rural areas in 1958 although this was not the case in urban areas. Over the next four years, the level of truncated TMFRs was consistently higher in urban than rural population. When the famine ended, levels of marital fertility in urban and rural areas became close again in 1962 and 1963. The difference between urban and rural populations in truncated TFRs emerged later than truncated TMFRs. This was partly a result of a higher proportion of marrying at younger ages among rural women in comparison with their urban counterpart. During the period between the mid-1959 and mid-1961, truncated TFRs in urban areas were also higher than rural areas, but this changed after the famine and a consistently higher fertility was found in rural areas since.

Figure 8  Changes in marital fertility in urban and rural areas

While both urban and rural populations were hit by the famine, the increase in mortality was far greater in rural areas. This was particularly notable in changes in Infant Mortality Rate (IMR). As shown in Figure 9, from 1956 to 1961, IMRs in urban population fluctuated at about the same level, perhaps with a slight increase between the late 1958 and the mid-1960. In contrast, IMRs in rural areas were already relatively high between the late 1957 and early 1958 in comparison with those in 1956 and the early 1957. They reached a very high level in the first half of 1959 and remained that high till the mid-1961

fertility rates is small in general. However, according to the traditional Chinese calendar, there were two months of August (Run Ba Yue) in 1957. In converting them, both were converted by the enumerator into September of the modern or western calendar. Since monthly fertility rates were computed in this study, the problem occurred in such conversions had a notable impact on fertility rates in some months, and September 1957 is one of them. Similar problems also occurred in July 1960 and May 1963 (because there were two months of June in 1960 and two months of April in 1963 according to the traditional Chinese calendar), although the impact of such problems was less observable in July 1960. We thank Yong Cai for his help in identifying this problem.
except for the early 1960. By the end of 1961, IMR fell to a lower level in rural areas and started its gradual decline thereafter.

Figure 9  Changes in infant mortality in urban and rural areas

![Graph showing changes in infant mortality in urban and rural areas from 1956 to 1965.](image)


The discussion presented above has led to another important observation. During the study period, notable differences in the relationship between infant mortality and fertility were found in both urban and rural populations. To study such a relationship, we could examine the link between infant mortality and fertility. Alternatively, we could use marital fertility rate in a given month as a proxy for the conception rate that existed nine months earlier to investigate the relationship between people’s reproductive behaviour and changes in the level of infant mortality.\(^9\) When such ‘estimated conception rates’ and IMRs are compared over time as shown in Figures A2 and A3 in the appendix, it has been found that there was a negative relationship between the two over the period from the mid-1958 to 1962. When the IMR was high, the conception rate was generally low, and vice versa. The link of this kind, which was not observable in other years, was stronger in rural than in urban areas. This might be related to the relatively low infant mortality in urban areas. These results further suggest that the urban population was better protected and its fertility was less affected during the time of the famine.

Differences in the patterns of IMRs and fertility (or people’s reproductive behaviour) and in their relationship between urban and rural areas were closely related to and affected by their different food supply systems that existed at the time. In urban areas, food was rationed, and usually distributed monthly through the use of coupons. While the supply

\(^9\) Computing conception rate is difficult because of the uncertainty of estimating spontaneous abortions occurred in the early period of pregnancy. This also results in uncertainty in explaining the causes of the low fertility or ‘estimated conception rate’. This ‘estimated conception rate’ is only used here as a crude indicator of the observed level of conception.
might not be sufficient, it was reasonably stable and could more or less maintain the level of subsistence. This helped to prevent urban residents from being severely affected by the famine. In rural areas, most villages were self-responsible to produce what their villagers need. After paid the tax and fulfilled its procurement quota determined often by the government, each village could distribute the remaining grain among its members according to their contribution to the production. This system was severely affected during the period of the Great Leap Forward and the famine by government promoted communal dining halls, which itself has been seen as a huge mismanagement or even a major cause of the famine (Peng 1987; Chang and Wen 1998). Under the food supply system that existed in rural areas, when there was a poor harvest or excessive procurement, like what happened in many places between 1958 and 1961, peasants would be left with a severe food shortage, if the government or society could not provide an effective assistance. This would inevitably exert a significant impact on people’s life.

8. Variations in demographic consequences of and responses to the famine in populations with different social demographic characteristics

In addition to investigating different demographic consequences of the famine between urban and rural areas, a series of logistic regression analyses have been conducted to examine variations in demographic impacts of and demographic responses to the famine among populations with different socio-demographic characteristics. Since the 1988 fertility survey was not particularly designed for the study of the demography of the famine and certain data that are important for such studies have not been collected, the regression analyses could be applied to only variables included in the data collection. For these reasons, the analyses may not be as desirable as we have hoped, but they help to shed further lights on the relationship between demographic changes in the famine period and some social demographic factors while the impact of some other factors was controlled for.

Our analyses have concentrated particularly on variations in marriage, fertility and mortality among different population groups over the period from 1958 to 1961. We have run three sets of logistic regression, with whether a person married, gave a birth, or died as the response variable in each of them, respectively. In the analysis of marriage, predictor variables have included a woman’s age, educational level, and area of residence. In examining the likelihood of giving a birth, sex composition of children having already had was also included as a predictor variable. In analysing the chance of dying in infancy and early childhood (aged 0 to 2), in addition to mother’s age, educational level and area of residence, we considered the impacts of the parity and sex of the children and sex composition of their surviving siblings. These analyses have produced the following major results.

The logistic regression results, which are presented in Tables A1, A2 and A3 in the appendix, have confirmed the conclusions reached in the previous section. During the period between 1958 and 1961, women living in rural areas, after other covariates being controlled for, were more likely to have married than their urban counterparts in the study provinces. Women in rural areas, in comparison with those in urban areas, were less likely to have given a birth and had a lower fertility. In contrast to their urban
counterparts, children living in rural areas experienced a higher mortality. In addition, the logistic regression revealed the following variations in demographic changes among different population groups.

Women with a higher level of education, after other covariates being controlled for, were less likely to have married than those with a lower level education. However, among married women who did not have children, those with a higher level of education were more likely to have given a birth than those with a lower level of education (mainly in urban areas). Women’s educational levels were also closely related to the risk of death of their young children. In comparing with those whose mothers with elementary school or a lower level of education, children having a mother with a higher level of education had a lower mortality. The slightly high fertility found among women with a comparatively high level of education was likely to have arisen from the fact that their families had a relatively high standard of living or were less affected by the famine. This was indicated by the relatively low infant and early child mortality found in their families.

The logistic regression has also found that women aged 20 to 29, in comparison with those under age 20 was more likely to marry during the famine. After other factors were controlled for, there was a negative relationship between mother’s age and infant and early child mortality over the famine years. In comparison with children whose mother’s age was under age 20 at the time of giving birth, those whose mother aged 20 to 29 experienced a lower mortality. Furthermore, levels of fertility and infant and child mortality were also closely related to the number and sex composition of children that already had in the families.

Our analysis shows, among women who already had two surviving children, in comparison to those with only daughters, those having had only sons or had both sons and daughters were less likely to have another child, and this was particularly observed in rural areas. These results support the findings made in section four. Children of higher parities had a higher mortality than those of lower parities, and this might be partly attributable to their relatively short birth intervals. Moreover, among children with one surviving sibling, those with an elder brother were more likely to die than those with an elder sister. Among those with two surviving siblings, children with two elder brothers were more likely to die than those with two sisters. These variations imply that in addition to the impact of poor nutrition and deterioration of health conditions which had affected the chance of conception and foetus survival, people’s intentional control of their fertility or family size and the differential treatments given to their children might have played a part in the formation of different fertility and mortality patterns observed across different population groups during the time of the famine, although this needs to be further investigated in a larger population.

9. Concluding remarks

The closer examination of China’s great famine presented in this paper has uncovered further evidence showing that the famine had catastrophic demographic consequences. Despite the potential bias arising from using retrospective survey data as discussed in section two of the paper, our analysis has suggested that marriage, fertility, mortality,
pregnancy outcomes, and indeed almost every aspects of people’s life were affected severely during the famine period. The famine led to a great human tragedy in China’s recent history and profoundly changed the course of social, economic and political development in the early decades of the People’s Republic.

An important finding made by this study is that as early as 1958, a notable decrease in marriage and fertility rates and an increase in infant and child mortality rate were already widely observed in the study population. The causes of these changes, however, remain less clear. Although a few studies have indicated that the fall in food supply was recorded in a few provinces in 1958, many studies suggested that China had a bumper harvest in that year (Peng 1987; Ashton et al. 1984; Chang and Wen 1998; Riskin 1998; Lin and Yang 2000). Even in the provinces where the food supply declined, whether it could have resulted in such demographic changes needs to be further investigated. If it was not the poor weather or poor harvest, the mismanagement and failed policies must be blamed for these changes. Then what were those failed policies and mismanagements? A number of studies have pointed to the impact a drastic reduction in food availability caused by exporting a large amount of grain to central government or other provinces, the large scale mobilization for constructing backyard furnaces, irrigation and other labour intensive projects, and the wide spread of communal dining hall and the mismanagement of food consumption that was closely related to it (Lin and Yang 1998; Chang and Wen 1998). How did these factors lead to the demographic disaster in these and other provinces needs to be further examined.

Another important finding revealed by this study is the great differences in demographic impacts of the famine and people’s demographic responses to it between urban and rural areas. This study perhaps is the first analysis that provides detailed quantitative evidence documenting that China’s great famine had very different demographic consequences in urban and rural areas. In the six provinces studied in this paper, rural population experienced considerably more demographic loss than its urban counterpart. Rural and urban populations also reacted differently to the famine depending on the severity of the disaster and what support or assurance they might, or expect to, receive from the government.

The remarkable differences found between urban and rural areas in demographic impacts of the famine and people’s demographic responses to it point to the importance of government policies and certain social institutions in helping to alleviate or aggravate the impacts of famine or disasters of the same nature, as suggested by Sen (1981) and other researchers (Kung and Lin 2003). During China’s great famine, urban dwellers were obviously better protected and they were less affected by the nationwide food shortage, but this was achieved at the cost of sacrificing the interest of the rural population (for example, through heavy or unrealistic tax and over procurement imposed in rural areas). This was directly related to China’s urban biased development and social policies. While this is an important lesson left by the great famine, it has not been studied and addressed adequately. Indeed, the impacts of such urban-biased policies still widely exist in China. They remain to be one of the great barriers in the construction of a harmonious society.
A further important finding made in this study is that when the population was struck by the famine, people were not only influenced passively by the severe food shortage. As a way of preventing further deterioration in living conditions and protecting their families or certain family members, people changed their demographic behaviour accordingly. This included postponing their marriage, slowing down their childbearing, and under extreme circumstances manipulating their pregnancy outcomes. Moreover, when people altered reproductive behaviour, such changes were often related to the number and sex composition of children they already had. This was a clear indication of deliberate fertility control. Such deliberate control was at least one of the most important causes of the great fertility reduction recorded in the famine period.

The confirmation of that many people intentionally controlled their reproduction and family size during the time of the famine has a significant theoretical implication. Different views on whether people could control their fertility or family size in the past, either in normal time or during famines, widely exist. In commenting on the fertility reduction during the famine, for example, Jowett suggested that it was most likely due to ‘famine induced infertility rather than a large increase in the use of contraception or other causes which are age and parity specific’ (1991:139). In contrast, Caldwell and Srinivasan believed that the major cause of the decline was probably due to ‘sexual abstinence and abortion, supplemented perhaps by an increased use of withdrawal. The mechanisms involved in the reactions to famine are probably known to millions of villagers around the world, but social scientists have conspicuously failed to throw much useful light on the matter’ (1984:74). Similarly, in debating people’s reproductive behaviour in Chinese history, some researchers suggested that Chinese people could have regulated their fertility or family size in the past (Campbell, Wang and Lee 2002; Zhao 1997 and 2006). But others claimed that ‘whatever the reason for moderate fertility in China, it was not deliberate fertility control’ (Wolf 2001: 177).

During the late 1950s and early 1960s, the People’s Republic was only founded for some 10 years. In many respects, China’s socio-economic development levels were still similar to those that existed a few decades ago. China’s demographic regimes were largely the same as those in the pre-transitional time although mortality decline was already underway. Family planning and the use of modern contraception were never heard by most people. It was under such conditions, China’s great famine took place. People’s demographic responses to the famine provided further evidence showing that in a society that similar to that in past, people had the intention to control their family size or fertility and when a hard time came they could change their demographic behaviour accordingly. It was possible that people have done the same under similar circumstances for many centuries. If this was indeed the case, some contemporary understanding about past demographic regimes would need to be reconsidered.
References:


Appendix

Figure A1  Changes in period parity progression ratios by sex composition of children already had, China, 1956-1965

Source: 1982 Fertility Survey
Figure A2 Estimated conception rate and infant mortality rate in urban areas

Figure A3  Estimated conception rate and infant mortality rate in rural areas

Table A1  Logistic regression results for the chance of getting married during the famine

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<th>Variables</th>
<th>Total</th>
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<th>Rural</th>
</tr>
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<td><strong>Age group</strong></td>
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<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>&lt;20 (ref)</td>
<td>--</td>
<td>--</td>
<td>-</td>
</tr>
<tr>
<td>20-24</td>
<td>2.94***</td>
<td>3.34***</td>
<td>.83***</td>
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<tr>
<td>25+</td>
<td>2.35***</td>
<td>3.47***</td>
<td>.10***</td>
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<td>0.39***</td>
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<tr>
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Number of observations 44,794 12,654 32,140
Number of groups (women) 16,892 4,531 12,361
Prob>chi2 0.00 0.00 0.00

Notes: (1) *** p<0.01, ** p<0.05, * p<0.1
(2) Women aged 15-29
Source: 1988 Fertility Survey
Table A2  Logistic regression results for the chance of having a(nother) child during the famine (Odds ratios)

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<th>Parity 2</th>
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<td>Rural</td>
<td>Total  Urban</td>
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<td>Age group</td>
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</tr>
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<td>20-24</td>
<td>2.16***</td>
<td>2.10***</td>
<td>2.18***</td>
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<td>25+</td>
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<td>Elementary or lower (ref)</td>
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</tr>
<tr>
<td>Middle school or higher</td>
<td>1.46***</td>
<td>1.61***</td>
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<td>Rural</td>
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<td>0.79***</td>
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<td>Sex composition of existing</td>
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</tr>
<tr>
<td>children</td>
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<td>Only sons</td>
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Notes:  (1) *** p<0.01, ** p<0.05, * p<0.1
        (2) Women aged 15-29
        Source: 1988 Fertility Survey
Table A3: Logistic regression for the chance of dying in ages 0-2 during the famine (Odds ratios)

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<td>0.63*</td>
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<tr>
<td>Rural</td>
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<td>1.75***</td>
<td>1.89***</td>
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<td>3rd child</td>
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<td>4th + child</td>
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</tbody>
</table>

Note: *** p<0.01, ** p<0.05, * p<0.1
Source: 1988 Fertility Survey