Estimating China's Population*

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ABSTRACT: The population of Mainland China is of critical importance in the study of world population, but it remains an unknown quantity. There are serious doubts about the meaning of historical population figures and the reliability of those collected by the Chinese Communists. The basic problem is that the actual process by which the figures were produced is, in most instances, obscure. Though the 1953 census was probably closer to an actual count of the population than any previous effort, it was evidently defective, and the registration system based on it even more so. Since 1957 there have been no official population totals. If estimates are substituted for missing or unreliable data, they must allow for considerable margins of error in representing the base total and trends in fertility and mortality. Estimates and projections which take account of the particularities of China's situation, past, present, and future, and of the appropriate degree of uncertainty regarding all aspects of China's demographic development will show a wide range of totals for any given year. Yet these estimates may encourage a proper caution in drawing conclusions, greater precision in making demographic assessments, and greater ingenuity in the pursuit of new lines of enquiry.

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SOONER or later, the study of world population must confront the unsolved questions about the population of Mainland China. Though China is not the world's only demographic question mark, it is certainly the largest, perhaps the most intriguing, and probably the most dangerous on which to hazard an uncircumspect surmise. Few statements can be made about China's population which are simple, safe, and significant.

The reason is that the population figures and the relevant descriptive information are difficult to assemble, interpret, and evaluate. The primary sources are in Chinese and either in relatively inaccessible documentary collections or in uncollected and elusive fragments, the pursuit of which constitutes a major diversion away from conventional channels of demographic enquiry. Often there is insufficient detail and continuity among the figures to permit their analysis for internal consistency and plausibility, and where such analysis is possible it usually discloses defects and anomalies. Only limited and sometimes ambiguous information is available on methods of collection and compilation, on the administrative systems in charge of these operations, and on the specific social, political, and cultural contexts within which they occurred, all of which may have introduced biases into the figures. The evaluation of these materials, whether rendered in the abstract or in population estimates and projections, rests upon judgments the criteria for which have not been established. All such judgments are highly uncertain and may be overturned at any time by subsequent research or the course of events. Nevertheless, despite inherent risks, the investigation into the population of China must be pursued, or we talk about the population of a world without China.

This brief paper can give only a general overview of the problems of assessing evidence and preparing population estimates and projections for China and a few of the reasons for trying.

THE CH'ING DYNASTY PAO-CHIA FIGURES

The study of China's population in modern times usually starts with the series of population figures which were initiated by a decree of the Ch'ing emperor Ch'ien-lung in 1741 and continued into the latter half of the nineteenth century. They originated in the records of the *pao-chia* system, an administrative device for transmitting civil control from the lowest level official magistrates through several echelons of unpaid deputies to the individual heads of households. Population reporting was never a primary function of the system. Ideally, the local magistrates were to keep track of the numbers of households and "mouths" in their jurisdictions by consulting the information on the door placards posted on each house, which in turn were supposed to indicate the number of "mouths" residing within. Annual checks and reports were to assure the congruence of the magistrates' records with the demographic realities.

How the totals assembled in Peking were actually compiled is not known, but the system was not supported by practical administrative arrangements and was inherently incapable of producing reliable counts of the population. Contemporary reports of its deficiencies are confirmed by the evidence implicit in the numbers themselves. Both national and provincial totals contain instances of impossible discontinuity and unbelievable regularity. Whatever the numbers signify, they are not demographic data in the modern sense.

Whether, in fact, they provide any

basis for assessment of the magnitude and rate of growth of the population of China, even during the years when the *pao-chia* system had reached its greatest efficiency, is a matter on which professional opinion is divided. Contradictory evaluations of the Ch'ing figures have been made by three well-known scholars, a historian and two demographers, each with a long-term interest in the subject. The historian, Ho Ping-ti, examines the changing administrative system of the Ch'ing dynasty as the key to understanding the population figures.[1] The demographers, John Durand and Irene Taeuber, test the figures themselves against the finitudes of population change and of data-collection methodology.[2] Ho concludes that the coverage of the early *pao-chia* reports was incomplete but that from 1779 to 1850 the figures are a reasonable representation of both the magnitude and the growth trend of the population.[3] Durand questions the reliability of the historical figures as an indication of magnitudes but is inclined to take them, in the absence of better information, as a reflection of trends wherever the trends are generally plausible.[4] Taeuber, after pointing up a number of instances of repetitive reporting and uniform increments in the provincial components of the Ch'ing figures, concludes that neither the magnitudes nor the trends of the total figures, however plausible, can be trusted if the components are manifestly untrustworthy.[5] As to whether the figures may be used to trace the growth of the population, the verdicts of the two demographers could hardly be more divergent. Durand believes the figures may be treated as the best available reflection of the actual trend of growth until more definite evidence is brought against them; Taeuber believes that any such use is naïve as long as the meaning of the Ch'ing figures is in doubt.[6] Such varied judgments reflect a lack of commonly accepted criteria in drawing conclusions from the evidence.

With the outbreak of the Taiping Rebellion in 1851, the already waning Ch'ing dynasty entered a time of troubles which culminated in its overthrow in 1911. During these sixty years, local officials had other preoccupations more urgent than the accuracy of the population reports. All scholars agree that the *pao-chia* figures for these years are worthless for demographic purposes, except to demonstrate how far the alienation of records from realities could go under conditions of extremity.

EARLY TWENTIETH-CENTURY CENSUSES AND SURVEYS

During the first half of the twentieth century, a new interest in population was awakened in China, stimulated by an intense debate in scholarly circles, both Western and Chinese, over the size of China's population and the effects of population on China's economic, social, and political ills. There were those who thought that the population was in the range of 250 to 325 million and that, far from contributing to China's sorrows, it could double with rising living standards, and without

[1] Ho Ping-ti, *Studies on the Population of China, 1368–1953* (Cambridge, Mass.: Harvard University Press, 1959).

[2] John D. Durand, "The Population Statistics of China, A.D. 2–1953," *Population Studies,* Vol. 13, No. 3 (March 1960), pp. 209–256. Irene B. Taeuber and Nai-chi Wang, "Population Reports in the Ch'ing Dynasty," *The Journal of Asian Studies,* Vol. 19, No. 4 (August 1960), pp. 403–417. The studies by Ho and Durand cover more than the Ch'ing era, as the titles indicate.

[3] Ho, *op. cit.,* pp. 3–23, 47–64, 97.

[4] Durand, *op. cit.,* pp. 239–244, 247–249.

[5] Taeuber and Wang, *op. cit.,* pp. 408–413.

[6] Durand, *op. cit.,* p. 249; Taeuber and Wang, *op. cit.,* p. 416.

improvement in basic technologies.[7] Others argued that the population of China was closer to 450 million and that an excess of human numbers was to blame for the miseries of the people and the instability of the government.[8]

The evidence consisted mainly of the results of several attempts by the central government to take a complete population count, a number of investigations in particular provinces, counties, and local units, and numerous estimates prepared on the basis of fiscal, postal, and other records. In their conception and design at least, the censuses and surveys display an increasing consciousness of Western notions of statistics and demography, but in their execution the influence of older Chinese habits of administration seems to have persisted. What actually took place in the field, where the true nature of the numbers is determined, is in most instances as obscure as ever. A count begun by the Ch'ing authorities in 1909 was interrupted before completion by the revolution of 1911. The population reports collected from the provinces by the newly established Republic of China in 1912 could not have been based on independent field investigations. A more ambitious effort was planned in 1927 by the Ministry of Interior in Nanking, but again the local authorities were unable to secure compliance with the census directives, and the provincial reports were still incomplete in 1931. In 1934, the *pao-chia* system was reinstituted in the areas in which it had disappeared. *Pao-chia* records were apparently the basis of the compilations of 1947, which stood for some time thereafter as the latest official figures on the population of China. However, the actual basis of the figures is indeterminable. Some of the areas for which figures were reported were already under Communist control. A national census was planned for March 1951 as part of the United Nations world census program, to be carried out with technical assistance and possibly some financial help from the United States government, but once again history interposed between plans and execution.

Though the investigations of this period produced no firm population totals, they represented a widening range of demographic enquiry. Some local surveys collected information on age and sex composition, vital rates, family size, marital status, literacy, education, ethnic status, and occupation. Most of the data are of uncertain reliability or obviously defective. Some are now being analyzed once more by means of recently developed techniques in the hope of eliciting from them whatever empirical substance their distortions have hitherto concealed.[9]

[7] W. W. Rockhill, "Inquiry into the Population of China," *Smithsonian Miscellaneous Collections* (Quarterly Issue), Vol. 47 (December 1904), p. 320. Rockhill's view of the size of the population was shared by Walter F. Willcox, though with reservations about the supporting argument at some points. See W. F. Willcox, "A Westerner's Effort to Estimate the Population of China and Its Increase Since 1650," *Institut International de Statistique Bulletin,* tome 25, 3eme livraison (La Haye, 1931), pp. 156–170.

[8] Among the scholars who favored higher figures were Chen Chang-heng, "Some Phases of China's Population Problem," *Institut International de Statistique Bulletin,* tome 25, 2eme livraison (Tokyo, 1931), pp. 18*–54*; A. M. Carr-Saunders, *World Population* (London, 1937), pp. 37–39; and Frank Notestein and Chiao Chi-ming, "Population," in John Lossing Buck, *Land Utilization in China* (Nanking, 1937), chap. xiii.

[9] E.g., Irene B. Taeuber, "The Conundrum of the Chinese Birth Rate" (Ottawa: International Statistical Institute, August 1963); and United Nations, Department of Economic and Social Affairs, *Provisional Report on World Population Prospects, as Assessed in 1963* (New York: United Nations, 1964) pp. 85–87.

THE CHINESE COMMUNIST POPULATION INVESTIGATIONS

Immediately upon securing control of the mainland in the summer of 1949, the Chinese Communists abolished the old *pao-chia* regulations and directed the municipal public security bureaus to set up a new system of population registers in the major cities based on new head counts. After the initial police surveys, which usually disclosed population totals larger than those previously indicated, the registration records were to be maintained by entering changes in household composition reported voluntarily by heads of household. But popular distrust of the police was too strong and co-operation too weak; repeated field checks were necessary to update the registers. In the rural areas, surveys of population, cultivated lands, and other details were made in connection with land reform as the basis for equitable redistribution of confiscated land and agricultural implements. These investigations reported rural population totals which were also much larger than previous records had shown.

The new urban and rural totals were published in local newspapers, from which they were compiled in several Chinese atlases, editions of which were in circulation abroad; yet neither the Communist authorities nor foreign scholars took any public notice of the higher population totals implied by these compilations. Between 1950 and 1953, the official sanction of several central agencies in Peking was conferred on various adjusted versions of the 1947 provincial and regional figures which exceeded the 1947 total by 10 to 30 million, but they were apparently not ready to accept the evidence from the new investigations pointing to a total 100 million larger. In 1952 the authorities decided to settle the matter by taking a nationwide census during 1953, the opening year of the First Five-Year Plan.

THE 1953 CENSUS

The stated purposes of the 1953 census were to provide data needed in planning national economic development and for establishing representation in the local and national people's congresses which were to be elected later in the year. There may also have been some unstated purposes related to the investigations of political backgrounds and "class" status to determine voter eligibility. In any case, the time and expense involved in planning, organization, experimental work, and full-scale enumeration by more than 2,500,000 cadres and the completion of the undertaking in spite of obstacles and delays attest to the seriousness of whatever purposes lay behind it.

When the final results of the census-taking were announced on November 1, 1954, a year after the originally scheduled completion date, the reported total of nearly 583 million inhabitants on the Chinese mainland as of the census date, June 30, 1953, was received with shock and incredulity on the part of many foreign scholars. Some suspected that the field offices had inflated their reports to please the Party leaders in Peking, who were supposed to regard a large labor force as the basis of national wealth, or that Peking had inflated the total to impress the rest of the world with the power of China under socialism. Others were ready to grant unhesitatingly that the figure was, as the Chinese Communists proudly boasted, the final answer to the quest for a definitive count of the population. Neither view could have been sustained by an examination of the field reports and news dispatches published in China while the census was in progress. These

left little doubt that a major field enumeration was under way but gave ample ground for doubt that the count could have achieved the level of accuracy of a modern scientific population census.

Between 1954 and 1956, the census records were used as the basis for extending population registration throughout rural China, but the system was in continual difficulties from the start. In some areas the census records were already several years out of date by the time the registers were set up, and, as before, voluntary reporting was to keep the records current, which, as before, it did not. Early in 1956 all population registration was consolidated under the control of the public security departments, leaving no doubt as to its prime purpose. Still, the registers were apparently the basis for the official population figures compiled with much difficulty and some supplementary estimating from the perennially belated local reports by the State Statistical Bureau from 1954 through 1957.

THE DISAPPEARANCE OF STATISTICAL DATA

With the appearance late in 1959 of the registration figure of 647 million for year-end 1957, publication of official population totals came to an end. In January 1958, the Ministry of Public Security issued a new set of regulations intended to discourage the derelictions and evasions of reporting which had plagued the system from its earliest beginnings, but before these could take whatever effect they might have had, the Party extremists had assumed command of all phases of domestic administration and policy. The "great leap forward" was on, and those types of statistics which could be used to inspire production efforts were at once transformed into sheer propaganda. Population statistics, having no such utility, fell into immediate neglect.

Soon after the "leap forward" staggered backward in 1959, a grim subsistence crisis ensued. It was not a good time for counting mouths. By the time recovery was under way in the latter part of 1962, more than four years had elapsed since the registration system had yielded a publishable national total. The tenth anniversary of the 1953 census passed without a new census and without any public recollection of the old one. In the spring of 1964 there were reports that another census was planned as of midsummer, but the few details of that operation which leaked out later indicated that it was no more than a police field check to restore the chronically lapsing population registers. In the latter part of 1964 a rumor circulated among foreigners in Peking that the check had produced a figure which Chinese officials found disturbingly large, but there has been no confirmation of the story.[10] Meanwhile, in the annual issues of the semiofficial *People's Handbook* since 1959, the venerable but aging 1957 year-end total has retained its post as the last really authoritative figure, with no threat of imminent succession.

Larger population figures have occasionally appeared in speeches and articles in China since 1957, mainly between 1959 and 1962, when totals of 660, 670, and "nearly" 700 million were used by Ch'en Yi and others to add numerical weight to the airy substance of the official rhetoric. But from 1962 onward most Chinese spokesmen reverted to the more conventional talking figures of 600 million (the 1953 census world-wide Chinese population total) and 650 million (the year-end 1957 mainland total rounded). In November 1964, by which time the central authorities may have received the results of the

[10] Joan Robinson, "What's New in China? —Peking, October 1964," *Eastern Horizon*, Vol. IV, No. 1 (January 1965), pp. 11–12.

midsummer police check, Edgar Snow was reportedly told by Mao in an interview in Peking that the population records used for rationing had been distorted by false reporting and could not be trusted to produce a reliable figure. Mao added that "some people" thought that the population was as large as 680 or 690 million, but that he himself did not believe it could be that large.[11] Ironically, the recently released communique of the eleventh plenary session of the Eighth Central Committee of the Chinese Communist Party, over which Mao reportedly presided in person, concludes with a reference to "the 700 million Chinese people," [12] which will certainly set that number echoing from the rostrums of China for some time to come.

However, numbers such as these are neither data nor estimates,[13] and there is no immediate prospect that either will be forthcoming in the near future. Although China supposedly embarked in 1966 on her Third Five-Year Plan, there is no statistical navigator to plot a measured course from a quantitatively known starting point to a quantitatively identifiable destination. The statistical system was swept away in the high tide of the "great leap forward." The rising tide of the "great cultural revolution," with a similar preference for simple faith in Party policies over objective evaluation of Party achievements, is not likely to sweep it back again. China is once more adrift in a numberless void.

DANGERS OF RELIANCE ON OFFICIAL FIGURES

For the present, there is no way of establishing beyond reasonable doubt the degree of correspondence to reality of the official population figures for China during any period in history. The mutually contradictory totals and series for the past two centuries cannot be taken as a representation of long-term population trends. The Chinese Communist data, though they are probably closer to the actual numbers of the population than any previous official totals, are still highly inaccurate by modern statistical standards, and are too often used without proper caution in studies of contemporary China.

In calculating per capita rates which have critical limits, as, for example, in studies of food availability in which consumption levels approach the minimum daily caloric intake, it is obviously unsafe to ignore the possibility that the official population totals may significantly understate the actual numbers of the population. If the trend of population growth is being compared with the increase trend in some other economic parameter for which the growth rate is of a similar order, a very small miscalculation in one or the other may lead to a wrong conclusion. It cannot be assumed that the official population figures are adequate for the purpose in mind unless trial calculations show that allowance for the maximum error in the direction least favorable to the findings of the study will not overturn them. There are also dangers in making free-hand extensions of the official figures for more recent years on the basis of the increase rate implied for 1956–1957,

[11] Edgar Snow, "Interview with Mao," *The New Republic,* February 27, 1965, p. 20.

[12] "Communique of the Eleventh Plenary Session of the Eighth Chinese Communist Party Central Committee" (adopted August 12, 1966), New China News Agency, Peking (in English), August 13, 1966. More ironical still, the number had been used by Chiang Kai-shek nearly two years earlier on the anniversary of the Republic of China. "Chiang Speaks on the Occasion of Double Ten," Central News Agency, Taipei, October 9, 1964.

[13] Any reasonable extrapolation from the series of official population data which ended in 1957, even with ample allowance for lower increase rates during the crisis of 1959–1962, should be close to 750 million as of midyear 1966.

or the mean increase rate for the First Five-Year Plan period, or by interpolating between the 1957 total and one of the later rhetorical figures. The gross misjudgments evident in some of these attempts suggest that population estimating is not something that any man with a desk calculator can do for himself.

Some of the hazards inherent in the official data for China can be avoided by substituting population estimates prepared by demographers.[14] These estimates have been based on a systematic examination of source materials, and some effort has been made to correct or allow for defects in whatever data were utilized in their construction. Usually demographers try to warn users against placing too much reliance on their estimates and point out the margins of error which must be understood if the figures are to be used appropriately. Moreover, their estimates are usually derived from model populations, which lends them at least the aesthetic virtue of internal consistency; their age-sex structures are functionally tied to their assumptions about trends in fertility and mortality, and the movement of totals and components of change reflects the mutual interplay of age composition and intrinsic vital rates. Of course, estimates are no substitute for hard data, and estimates for China may wander far from the mark; but, all in all, there are probably few uses for official data from China for which demographic estimates would not be preferable.

[14] The several sets of estimates available have been designed for different purposes and employ different assumptions and methods of presentation. In making their selection, users should read the explanatory texts with care. The United Nations Department of Economic and Social Affairs has published two sets of estimates employing substantially the same methods and assumptions: *Future Population Estimates by Sex and Age, Report IV: The Population of Asia and the Far East, 1950–1980* (New York: United Nations, 1959), pp. 24–28 and 76–99 and *Provisional Report on World Population Prospects, as Assessed in 1963* (New York: United Nations, 1964), pp. 81–96 and 118–119. A revised version of the latter report is to be published soon. In a paper entitled "World Population Estimates, 1750–2000," given at the United Nations World Population Conference in Belgrade, Yugoslavia, August 30–September 10, 1965, John Durand has included selected figures from his own estimates for the years from 1750 to the present, which are consistent with the United Nations projections from 1960 onward. Population estimates for the First Five-Year Plan period only were presented by John S. Aird (U.S., Bureau of Census, *The Size, Composition, and Growth of the Population of Mainland China,* International Statistics Reports, Series P-90, No. 15, Washington, 1961, pp. 65–91). A new Census Bureau series of estimates and projections covering the period from 1750 through 1985 was prepared during 1965. A paper presenting the figures for the years from 1953 through 1985 will appear shortly as a chapter in a volume edited by Alexander Eckstein, T. C. Liu, and Walter Galenson, tentatively entitled *Economic Trends in Communist China,* to be published by the Aldine Press, Chicago.

PROBLEMS IN CONSTRUCTING POPULATION ESTIMATES FOR CHINA

To construct population estimates, it is necessary to have a base population as of a particular point in time, a pattern of distribution by age and sex, and some measure of the trends in fertility, mortality, and, if significant, migration for the years the estimates are to span. In China's case, where assumptions must often take the place of data, the problems are many. It is generally, though not universally, conceded now that the census of 1953 was probably the nearest thing to a complete head count that has ever taken place in China, hence the census figure is, by default if not by merit, the prime choice for a base population total. However, the census figure must still be regarded as an approximation, and though the evidence suggests that omissions outweighed double-counting, the possibility of a net overcount

cannot be excluded altogether.[15] Since even a moderate margin of error in relative terms signifies very large absolute differences when applied to so large a magnitude, some way must be found to represent the base population as a set of limits rather than as a single total. There is no reason why the census figure should be taken as the midpoint of the range or even as falling within the range at all if the estimator is prepared to argue that the net error in the census figure is clearly in one direction or the other.[16]

If the estimates are to be extended backward over the past several centuries for use in historical studies of world population development, there is another major problem. Prior to the release of the 1953 census results, demographic opinion generally concurred in the view that the century from 1850 to 1953 had seen little or no net population growth in China. The reasoning was that whatever limited increase occurred in the first half of the twentieth century was not much more than enough to compensate for the net loss of population during the major upheavals and catastrophes in the last half of the nineteenth century. This view was not actually based on a comparison of the Ch'ing total of 430 million in 1850 with the official figures and estimates in the range of 450 to 465 million for the 1930's and 1940's,[17] but it was consistent with these figures. However, the 1953 census total, being more than 100 million larger than the figures current in the 1940's, introduces a dilemma. If there was no appreciable increase in the troubled century between, the actual population in 1850 must also have been well over 500 million; if the 1953 census undercounted the population, the 1850 total could have exceeded 600 million, and the Ch'ing figure for 1850, instead of being, as some scholars have argued, an exaggeration of the actual population would have understated the population by anywhere from 15 to 30 per cent and perhaps more. If both the Ch'ing 1850 figures and the 1953 census total are taken as reasonable magnitudes, the idea of a century without population growth must be replaced by an assumption that the population grew by at least 35 per cent; if the Ch'ing total was too high and the 1953 census total too low, the implied increase is greater still. Moreover, if the rather high increase rates implied by the Ch'ing figures are rejected in favor of lower increase rates, the discrepancy between the estimated and the reported totals gets larger the farther back we go.[18]

[15] The writer has argued the case for a net undercount in the census. See U.S., Bureau of the Census, *op. cit.*, pp. 11–29, and John S. Aird, "The Present and Prospective Population of Mainland China," *Population Trends in Eastern Europe, the USSR, and Mainland China* (New York: Milbank Memorial Fund, 1960), pp. 94–104.

[16] For example, if it is assumed that the census was an undercount, and if to represent this judgment numerically the range of undercount is set at not less than 5 per cent and perhaps as high as 10 or 15 per cent, the base range as of mid-year 1953 for the population of China could be between 610 and 650 or even 685 million. If one employs a mechanical assumption of plus or minus 10 per cent from the census figure, the range would be 525 to 610 million. For analytical purposes, the uncertainty about the size of the base population is obviously a serious matter.

[17] The Republic of China, Ministry of Interior, Bureau of Population, published in 1947 a compilation of provincial and municipal population figures for all of China, including Taiwan, which totalled 463 million. *Chüan-kuo hu-k'ou t'ung-chi* [*Household Statistics for China*] (no place of publication indicated), 1947, first table.

[18] For example, accepting the census figure of 583 million for 1953 and assuming no net increase between 1850 and 1953, the total for 1850 is also 583 million, about 35 per cent above the Ch'ing figure. If we carry this magnitude back to 1750 at the rate of increase implicit in the Ch'ing series, which implies a maximum average increase rate in the

Hence a major decision looms: either the Ch'ing figures must be rejected as far too low, or the conception of mortality levels and increase rates between 1850 and 1953 must be rejected as too pessimistic, or the 1953 census total must be rejected as too high, or some combination of adjustments in the directions indicated must be devised. None of these adjustments can be made without contradicting settled scholarly judgments in one quarter or another.

So far as the level of the vital rates for China is concerned, demographers and scholars have generally concurred in the view that fertility levels must of necessity have been high from time immemorial to insure the replacement of numbers in spite of recurrent famine, pestilence, and civil disturbance. Prior to 1953 most Western demographers supposed that the actual crude birth rate for China exceeded 40 per thousand population, and that lower figures obtained in surveys during the second quarter of this century were due to defective counting of births.[19]

Since the release of official birth rates of 37 to 32 per thousand for various years from 1952 through 1957,[20] some demographers have used rates below 40 per thousand and have assumed falling fertility levels as early as 1955 in their population estimates, but others doubt whether the official rates can be trusted or whether either of the two officially sponsored fertility reduction campaigns in China, 1954–1958 and 1962 to the present, have achieved results measurable on a national scale.[21]

It is also generally conceded that the death rate remains today, as in the past, the principal regulator of population growth in China. Although the Chinese Communists have brought about a major reduction in general mortality by maintaining civil order, controlling food allocation, and introducing better sanitation and medical care, the death rates are probably moderate by world standards even in good times and subject to sudden short-term increase during periods of food crisis such as 1959–1962. Professional opinion is unanimous that the official death rates, which range as low as 11 per thousand population, are unreasonable and probably reflect acute underreporting of deaths, but it is hard to devise a rationale for estimating mortality levels directly.

One approach is to derive mortality levels as a residual of the levels assumed for fertility and for natural increase.

late eighteenth century of around 1.5 per cent per year, the total in 1750 is 243 million, also about 35 per cent above the official Ch'ing figure of 180 million. However, if we substitute an increase trend similar to the official one but reaching a peak of only 1.0 per cent per year, the estimated total in 1750 is 308 million, or more than 70 per cent above the Ch'ing figure.

[19] Chiao Chi-ming, Warren S. Thompson, and D. T. Chen, *An Experiment in the Registration of Vital Statistics in China* (Oxford, Ohio, 1938), pp. 40–44, and Marshall C. Balfour, Roger F. Evans, Frank W. Notestein, and Irene B. Taeuber, *Public Health and Demography in the Far East* (New York: 1950), p. 74.

[20] The figures for some years are available only in statistical handouts to several foreign visitors to China in 1958. See Roland Pressat, "La Population de la Chine et son Économie," *Population,* Vol. 13, No. 4 (October–December 1958), p. 570, and S. Chandrasekhar, *China's Population: Census and Vital Statistics* (Hong Kong, 1959), p. 50.

[21] The United Nations estimates prepared in 1963 employ a crude birth rate of 38 per thousand for the period prior to 1950 and continue this rate in one set of assumptions through 1955; another series permits an increase in fertility levels between 1950 and 1955. Thereafter, some series assume the beginning of a long-term trend toward lower fertility rates. The Census Bureau estimates prepared in 1965 assume alternate fertility levels equivalent to crude birth rates of 40 and 45 per thousand as of 1953. These assumptions do not necessarily represent the limits of possibility in either direction. See sources cited in footnote 14.

Here, too, there are problems in determining both historical and current increase rates. In estimates which span long periods of time, small differences in assumed increase rates result in large differences in population totals; in estimates for the current period, small differences in increase rates have little effect on magnitudes, but the differences are more conspicuous because they result in an immediate departure from the trend of the official series, which makes some potential users uncomfortable. Yet a certain amount of boldness in positing assumptions is necessary if the increase trends are to reflect as much historical particularity as possible and also to embrace the reasonable margin of uncertainty without going to absurdity. Needless to say, there is little consensus about what constitutes reason, uncertainty, or absurdity in these matters.

Whatever decision is made about alternate patterns of vital rates for the century prior to 1953 must also determine the alternate patterns of age-sex structure assigned to the 1953 population. The complete census age-sex structure has never been published in an official document, but a close approximation can be pieced together from various fragments contained in official releases, commentaries, and technical articles written by persons in China who apparently had access to some of the original census data.[22] The profile which appears when these materials are assembled is more regular and free of obvious distortion than those obtained in previous investigations of mainland populations, but some anomalies are apparent, especially in the sex ratios at certain ages, which cannot be explained. To prevent these peculiarities from influencing age-sex composition and vital rates in subsequent years, most demographic estimates and projections substitute hypothetical age-sex distributions.

[22] For one such reconstruction, see U.S., Bureau of the Census, *op. cit.*, pp. 65–69.

DESIGNING POPULATION PROJECTIONS FOR CHINA

The problems in making projections for China are similar to those involved in making estimates, but the imponderables are multiplied. Up to the present, though there are no current figures, there is some information on living conditions in China upon which to base estimates of birth and death rates. From this point on, general socioeconomic circumstances must also be projected. But the factors involved are many, their relationships complex, and their future course subject to such wide-ranging possibilities that alternative assumptions about the state of China's national development a decade or two from now scarcely seem to refer to the same country.

It is much simpler to apply to China extrapolations based on generalized demographic experience or on analogies to other agrarian societies which have achieved some success in economic development. However, unless one is prepared to argue that China will necessarily recapitulate the socioeconomic evolution of other places and periods, which few demographers would, there would seem to be little value in multiplying China's size by other peoples' history. If the projections are not to be misleading, they must draw their assumptions from an appraisal of China's own peculiar situation and prospects, with proper regard to the uncertainty which attaches to all aspects of her national development.

If the economy is able to advance under stable and consistent leadership, both fertility and mortality may decline slowly as new economic incentives alter old patterns of family formation and as the general level of health and sanitation improves. If the economy fails to make a significant general advance and if

food production fails to keep pace with population growth, recurrent food shortages may cause mortality levels to rise sharply from time to time and fertility control may be difficult to propagate. If a particularly severe food crisis, a war, or an intra-Party struggle should disrupt the system of civil control upon which rationed food distribution depends, mortality could achieve a scale beyond anything in human experience, resulting in a new relationship between man and resources in China. The extreme alternatives leave wide latitude for intermediate patterns and combinations, the demographic implications of which are harder to define. The extrapolation of recent trends in national development is especially problematical because of the lack of continuity in domestic policies and programs in such critical areas as economic planning, health, civil administration, and fertility control, which change not only with changes in objective circumstances but with each new alignment within the Party Central Committee. Few possibilities can be excluded.

If all the possibilities for China's population are incorporated into alternate estimates and projections, the totals at the upper and lower limits describe an extremely wide range. Estimates for recent years may differ by as much as 100 to 150 million. Estimates which go back to 1750 may have a range of over 250 million with smaller magnitudes. Projections for 1985 have a spread of more than half a billion with no guarantee that all possibilities have been covered. Do such wide-ranging figures serve any useful purpose?

Their use in some studies may serve only to plunge the analysis into such doubt that no definite conclusions can be drawn, which will not enhance their popularity with the users. But to discourage unwarranted conclusions by pointing out the extent of warranted uncertainty in key variables *is* a useful purpose if science and scholarship are to observe adequate standards of quality control in respect to their statistical inputs. Meanwhile, for demographers who work on China, the making of estimates and projections imposes somewhat tighter discipline on the exercise of demographic judgment by requiring that evaluations of the various parameters be quantified, their functional relationships rationalized, and the limits of assumption specified. Moreover, in the case of a country like China, where statistical famines are recurrent and prolonged, the attempt to synthesize demographic and other socioeconomic elements in configurations which express their mutual contingency and thus limit the latitude for assumption points up the inadequacies of current theory and techniques and the urgency of discovering new modes of research. In this way, the study of China's population may ultimately be justified by contributions which go beyond the confines of China area studies and even of demography.