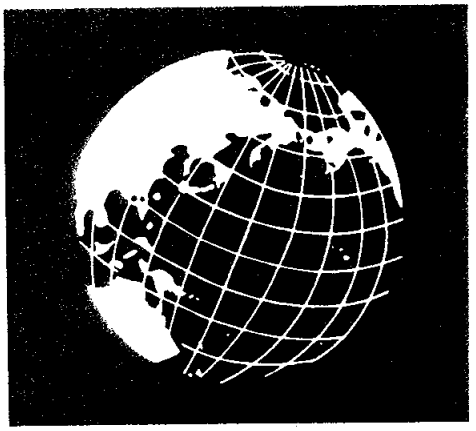
East-West Population Institute
February 1985

East-West Center Honolulu, Hawaii
Volume 11 Number 3
ISSN 0732–0515



Asian and Pacific CENSUS FORUM

Conference Explores China's New Data Resources

by Robert L. Hearn and Judith Banister

If one date marks the opening of China to the international demographic community, it is 1982. Not only was that the year of China's Third National Population Census, it was the year of its National Fertility Survey and the year that age-structure data from China's two earlier censuses were released. The sudden availability of these data has created a flurry of demographic activity on China.

In order to assess this activity, the Joint Committee on Chinese Studies and the East-West Population Institute invited officials from China's statistical offices and scholars from both inside and outside China to come together to exchange their views and experiences. The occasion for this exchange was the Workshop on China's 1982 Population Census held at the East-West Center in Honolulu, 3–7 December 1984.

Since the 1982 census, the demographic situation in China has been made much clearer. Previous analysis was largely guesswork based on the meager official statistics that had been released. Consequently, because China represents over one-fifth of the world's population, any assessment of the global demographic situation was tentative at best. Recent research, however, has clarified such aspects of China's population as fertility, mortality, marriage patterns, education, employment, urbanization, and the geographical distribution of the population. These became the major topics of the workshop agenda.

One of the most important findings to come out of the recent analyses is that the data are living up to the Chinese claim regarding their accuracy. Ansley Coale made a presentation on the quality of the age-sex data, and his conclusion was that it is "phenomenal." In the course of preparing a monograph, *Rapid Population Change in China, 1952–1982,* for the National Research Council, Coale tried every method he could think of to detect errors or inconsistencies in the Chinese data. He found virtually none. But even though the age reporting is almost perfect, there are certain blemishes in it, and when the reported age structures from the three censuses are placed side by side, the same blemishes (such as the slight dip in fertility in 1910–12 at the time of the Sun Yat-sen revolution) appear in the same cohorts in all three censuses.

This fineness of detail not only demonstrates the quality of the 1982 census, it also demonstrates the quality of the 1953 and the 1964 censuses. The single-year age structures for those censuses were not released until the end of 1982 when they were published with the hand-tabulated results of the 1982 census. Data for the proportion of women surviving from one census to the next classified by single years of age at the earlier census show minor defects in the data. The limited fluctuations in the survival ratios from one age to the next, and the reasonable patterns in the survival ratios, indicate highly uniform completeness of coverage by age and extremely limited age misreporting. Evidently an effective procedure for converting date of birth from the animal year and lunar month to a Western date was used in all three censuses.

Coale noted that some demographers and statisticians have suggested that the population registers, the censuses, and the National Fertility Survey suffer from a lack of independence and that the consistency of the data results is not convincing evidence of the data's accuracy. If the number of children born to a given woman is copied from the register, the number recorded in the 1982 census and the number listed in the sample survey might be the same without being correct.

However, Coale said that the procedures followed in the 1982 census and survey, as published, involved much more than checking the registers. There was extensive preparation,

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Asian and Pacific CENSUS FORUM

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THE ASIAN AND PACIFIC CENSUS FORUM is a quarterly publication of the East-West Population Institute, East-West Center, supported by a cooperative agreement between the Institute and the Office of Population, Agency for International Development. The *Census Forum* reports on census, vital registration, and population survey activities in Asia and the Pacific in an effort to promote the effective collection and use of population data.

The *Census Forum* staff invites readers to submit articles of interest to those working with and on censuses, technical articles on demographic analysis, announcements of related news, and reviews and notices of recent publications.

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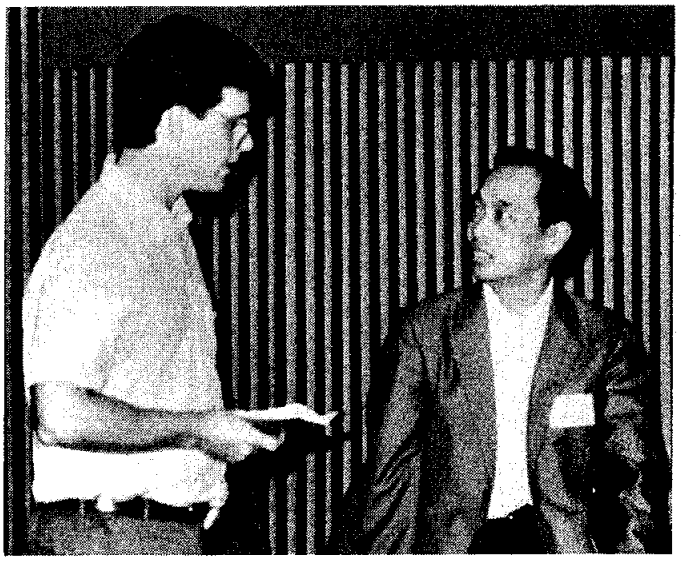

Jeffrey Taylor talking with Sun Jingxin.

pretesting, and postenumerative checking for the census. The published descriptions of the procedures for the fertility survey specified face-to-face interviews for the detailed marriage and fertility histories. The annual numbers of births derived from a combination of census-based estimates of numbers of women each year and survey-based retrospective data on fertility rates are quite different from official records of the annual number of births. In other words, the fertility histories are in wide disagreement with registration data on births and so cannot have been derived from the registers.

Sun Jingxin of China's State Statistical Bureau described some of the measures taken to ensure the accuracy of the data. One of the things he emphasized was the care with which the postenumeration survey (PES) was taken. There has been some concern that, since the PES got such low estimates of error rates, it must be wrong.

A postenumeration survey, no matter how carefully done, tends to duplicate the errors of the census. Realizing this, Sun said, China organized its postenumeration survey very carefully. The PES was done with face-to-face interviews, and for any area that was going to be in the PES, the questionnaires that were filled out in the census were sealed and kept away from the PES enumerators to make sure there was no way to copy. As a further precaution, an enumerator who conducted the census in one area was not permitted to conduct the post-enumeration survey in that area.

Another concern that has been expressed in foreign demographic articles is that the great reliance of the census on the household registration system meant that anybody who was not in the registers was not counted in the census, that is, that the census was limited by the completeness of the registration system. Sun made it very clear that the registers were used as a guideline, like an address list, but did not limit the count. He supported this contention with the fact that the census counted 4.75 million more people than were in the registers.

This was in part due to an improvement of the 1982 census over the 1964 census. The 1964 census counted people at their

Workshop on China's 1982 Population Census

3–7 December 1984
Honolulu, Hawaii

Cosponsored by the Joint Committee on Chinese Studies, American Council of Learned Societies, and the East-West Population Institute, East-West Center.

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place of registration, as did the Wuxi pretest for the 1982 census. But the census organizers learned from the pretest that this was the wrong approach. They decided to count people where they lived and changed the questionnaire to distinguish persons living in an enumeration area whose registration was elsewhere, persons whose registration was pending or to be determined, and persons registered in the enumeration area but working or studying abroad. Nearly 11.4 million people were enumerated in these three categories. Thus, even though the address lists were taken from the registers, enumerators were constantly on the lookout for people who were not registered in their area.

Sun described the census quality control system: work at each stage was checked and verified before being accepted. Errors were corrected by going back to the questionnaires, respondents, and other local residents before further processing. In addition, a responsibility system set up detailed standards of quality for enumerators, supervisors, coders, data entry operators, and computer staff so that everyone would know his or her responsibilities. Furthermore, it was clearly announced that the heads of the census leading groups and directors of the census offices were fully responsible for the quality of work in their areas.

Sun's paper emphasized that the census was carefully designed, carefully planned and pretested, and made full use of the household registration data in order to get a complete count of the population. It was a high quality census, Sun said, because the Chinese worked hard to make it a high quality census, and it cost a lot of resources to do that.

Sun discussed the question of whether the 1982 census was too expensive. He said it was extremely expensive. But the consensus of opinion at the conference was that so little was known about China's population, and the need for good benchmark data was so great, that it was worth doing the census really well this one time. It was agreed that such a high level of accuracy, while important to achieve this once, might not be so critical to attain in future censuses.

Lee-Jay Cho pointed out some other factors that contributed to the success of the census: China's strong administrative

controls, the traditional respect for authority in the culture, and a favorable political climate following the death of Mao Zedong and the fall of the "Gang of Four." China's leaders after Mao recognized the severe need for demographic data and hence were firmly committed to the census. At the same time, the Chinese people, having just emerged from the bleak decades that included the Great Leap Forward and the Cultural Revolution, were eager for some material improvement in their lives. It was Cho's assessment that the masses of people in China enthusiastically supported the census as a vital component of the Four Modernizations development plan.

Wang Suling, a computer software engineer for the State Statistical Bureau, described an important component of the data processing quality control system created for China's 1982 census: a special master computer program for flow control to make sure that all data got in once and only once. Given the number of questionnaires, it was physically impossible to do all the computer processing in one computer center in Beijing. So the Chinese decided to set up computer centers in the statistical bureaus of 28 of the 29 provinces. Each provincial statistical bureau would be responsible for the complete tabulation of the census returns for that province (the tabulations for Tibet were done at the national computer center). The computer results, on tape, would be transferred to Beijing to the master computer for the national compilations. For this system to work, the data from each provincial statistical bureau had to be completely consistent and compatible with the data from the other provincial bureaus.

The master control program was designed to keep track of which counties were fully tabulated, which were partially tabulated, and where the tabulation had stopped—in other words, the status of data entry, editing, and tabulation at any moment in time. A geographical number code was developed to identify each batch of data. It was based on the administrative system and consisted of successive numbers identifying province, prefecture, county or municipality, commune or district, brigade or neighborhood, and production team or residents' group.

In response to a question, Wang assured the group that, while editing and imputation rules had been applied after the data were entered, a copy of the original, unedited data tape had been retained so that one could go back and edit in a different way should an improved editing or imputation system be developed in the future.

Y. C. Yu, one of the chief United Nations advisers who worked with the Chinese on the planning stages, particularly the design of the questionnaire and plans for how the enumeration would be carried out, presented a paper on external assistance for China's 1982 census. He emphasized that the Chinese government developed all census and data processing plans itself and executed them successfully and on schedule. He said that external assistance played a secondary, although important, role.

One important contribution of the UN advisers was to recommend an advance computer tabulation of 10 percent of the census questionnaires. Originally the manual tabulation of results was to be followed by 100 percent computer tabulations, which would have significantly delayed the publication of results. The 10 percent sample tabulation, using the production team or residents' group as the sampling unit, was recommended as a means of releasing usable data sooner. Since the production-team sample could be done in the county-level census offices, there was less work involved in preparation and supervision than if the sampling were done with the household as the sampling unit. Analysis of data from the Wuxi pretest showed that sampling errors from the 10 percent production-team sample were not significantly different from those in a 1 percent household sample, which had also been considered.

The UN advisers also recommended a geographically based postenumeration survey plan instead of a register-based plan. A nationwide sample of somewhat over 1,000 production teams and residents' groups representing each major civil division and covering a total of 187,362 persons in 43,570 households was selected for the PES. The areas of the selected units were delineated on sketch maps and covered by house-to-house canvassing. The PES questionnaire included the name, relationship to household head, sex, age, and household registration status of each person, and the numbers of births and deaths in the household in 1981. Responses from the PES were matched against responses from the census questionnaires at the city and county census offices. The final verification and summary were done at the National Census Office.

A paper by Xiao Zhenyu, Tuan Chi-hsien, Yu Jingyuan, and Li Bohua compared the results of the census with the results of the sample fertility survey. Xiao, chief of the Division of Planning & Statistics in China's State Family Planning Commission, explained that the fertility survey was a supplement to the census and the two served as a mutual check on some items. The fertility survey, however, collected detailed information relevant to family planning policy.

The reference times for the census and survey were the same—0000 hours, 1 July 1984—and coverage was almost the same (the survey did not cover Tibet). With respect to content, the two operations complemented one another. The census provided authoritative mortality data for all ages; the survey concentrated on infant mortality data. The census obtained data on marital status as of the reference time; the survey collected data on age at first marriage and changes of marital

(continued on page 9)

Xiao Zhenyu, Peter Smith, Ansley Coale (covered), *and Chi-hsien Tuan enjoy a break between conference sessions.*

On Feeney's Method for Correcting Age Distributions for Heaping on Multiples of Five

by P. C. Saxena and B. H. Gogte

Age distributions obtained from censuses and surveys in most developing countries exhibit heaping on ages that are multiples of five. Feeney (1979) suggested a technique for redistributing the excess numbers of persons at these ages to the surrounding ages. Feeney's procedure involves the transfer of excess persons from a given multiple of five to the eight immediately surrounding ages, the four years on either side of the multiple of five, in such a way that (1) the adjusted numbers in the surrounding ages are proportional to the original numbers; and (2) the adjusted numbers at the lower four ages, the central age, and the upper four ages form a linear progression.

The second of these two requirements involves forcing the age distribution into a series of straight line segments centered at multiples of five. From a preliminary analysis of Indonesian age data Feeney claimed that his procedure was "remarkably effective, far more so than any existing procedure for smoothing or otherwise correcting age distributions." (1979:14)

Feeney's method, which involves an iterative procedure, is somewhat complicated. The purpose of the present paper is to investigate the possibility that a simpler procedure for smoothing or adjusting age distributions may yield equally effective results. For reasons to be explained shortly, a nine-point moving average was selected for comparison. Below, Feeney's method and two alternative approaches are applied to age data for India, Indonesia, and Tanganyika and the results compared.

Feeney's Method

Notation

P_x = Number of persons aged x in completed years

P_{x-} = Number of persons aged $x-4$ to $x-1$ in completed years

P_{x+} = Number of persons aged $x+1$ to $x+4$ in completed years

where x is a multiple of 5 (i.e., $x = 5, 10, 15, \ldots$).

The first of the two requirements mentioned earlier, that the adjusted numbers in surrounding ages must be proportional to the existing numbers, can be expressed mathematically as

$$P'_{x-} = P_{x-}\,\Delta_x \quad (1)$$

$$P'_{x+} = P_{x+}\,\Delta_x \quad (2)$$

where primes (′) indicate adjusted quantities. The constant of proportionality, Δ_x, is assumed to be the same in both (1) and (2), so that the adjustments to ages on either side of the multiple of five are multiplicatively symmetrical.

The second of the two requirements mentioned earlier, that the adjusted numbers at the lower four ages, the central age, and the upper four ages must form a linear progression, can be expressed mathematically as

$$P'_x = \tfrac{1}{2}\,(\tfrac{1}{4}P'_{x-} + \tfrac{1}{4}P'_{x+}) \quad (3)$$

In other words, for the progression to be linear, the middle value must be midway between the average number of persons at the lower four ages and the average number at the upper four ages. Substituting (1) and (2) into (3), we can rewrite (3) as

$$P'_x = \tfrac{1}{8}\Delta_x\,(P_{x-} + P_{x+}) \quad (4)$$

Equations 1, 2, and 4 are valid for any value of Δ_x. Suppose we define Δ_x as

$$\Delta_x = \tfrac{8}{9}\,\frac{P_{x-} + P_x + P_{x+}}{P_{x-} + P_{x+}} \quad (5)$$

Then equations 1, 2, and 4 can be written as

$$P'_{x-} = P_{x-} + (\Delta_x - 1)\,P_{x-} \quad (6)$$

$$P_{x+} = P_{x+} + (\Delta_x - 1)\,P_{x+} \quad (7)$$

$$P'_x = P_x - (\Delta_x - 1)\,(P_{x-} + P_{x+}) \quad (8)$$

Equations 6 and 7 follow immediately from (1) and (2), regardless of the value of Δ_x. Equation 8, though not valid for all values of Δ_x, is valid for the value of Δ_x specified by (5). This may be demonstrated by equating the right-hand sides of (3) and (8), substituting the expression for Δ_x from (5), and simplifying; the result is an identity.

Equations 6–8 are not the final equations, however. When all multiples of five are considered together, rather than in isolation, the increments to the numbers of persons intermediate between two successive multiples of five are made independently from the lower and upper multiple of five. That is, ages $x-4$ and $x+4$ get a double dose of reallocation. Thus (6) and (7) must be altered somewhat and (8) rewritten in an equivalent but alternative form. Equation 8 becomes

$$P'_x = P_x - (\Delta_x - 1)\,[P_{(x-5)+} + P_{x+}] \quad (9)$$

Equations 6 and 7 become one and the same equation, which can be written as

$$\begin{aligned} P'_{x+} &= P_{x+} + (\Delta_x - 1)\,P_{x+} + (\Delta_{x+5} - 1)\,P_{x+} \\ &= (\Delta_x + \Delta_{x+5} - 1)\,P_{x+} \end{aligned} \quad (10)$$

Equations 9 and 10 are Feeney's basic estimating equations. They are valid for $x = 0, 5, \ldots, c-5$, where Δ_0 and Δ_c are taken equal to one, c denoting the age (also a multiple of five) that begins the open-ended age group. The adjustment procedure specified by (9) and (10) is iterated until the values of Δ_x

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Table 1. Recorded and Adjusted Age Distributions of India, 1971

Age	Recorded Population (in '000)	Adjusted Population (in '000)			Percentage Difference		
		Feeney Method	Method A	Method B	Recorded and Feeney Method	Feeney and Method A	Feeney and Method B
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0–4	79,559	79,350	79,607	79,528	+ 0.26	- 0.32	- 0.22
5–9	82,007	81,237	81,166	79,167	+ 0.94	+ 0.08	+ 2.50
10–14	68,768	66,904	66,896	66,791	+ 2.71	+ 0.01	+ 0.16
15–19	47,468	52,647	51,636	52,958	-10.91	+ 1.92	- 0.59
20–24	43,101	45,739	45,690	45,732	- 6.12	+ 0.10	+ 0.01
25–29	40,820	41,755	42,337	41,682	- 2.29	- 1.39	+ 0.17
30–34	36,188	36,634	37,045	36,994	- 1.23	- 1.12	- 0.98
35–39	32,898	32,270	32,538	32,329	+ 1.91	- 0.83	- 0.18
40–44	28,288	27,343	27,294	27,418	+ 3.34	+ 0.17	- 0.27
45–49	22,885	22,471	22,711	22,759	+ 1.81	- 1.06	- 1.28
50–54	20,531	18,213	18,128	18,291	+11.29	+ 0.46	- 0.42
55–59	12,828	14,442	14,171	14,527	-12.58	+ 1.87	- 0.58
60–64	14,374	11,211	11,715	11,337	+22.01	- 4.49	- 1.12
65–69	7,001	7,396	6,979	7,541	- 5.64	+ 5.63	- 1.96
70–74	5,879	4,544	4,611	4,667	+22.71	- 1.47	- 2.70
75–79	2,246	2,693	2,318	3,123	-19.90	+13.92	-15.96
80–84	1,976	1,968	1,975	1,973	+ 0.40	- 0.36	- 0.25
85+	1,227	1,227	1,227	1,227	–	–	–
Not stated	116	116	116	116	–	–	–
Total	548,160	548,160	548,160	548,160	–	–	–

SOURCE: Base data are from India, Office of the Registrar General, *Census of India 1971, Social and Cultural Tables,* ser. 1, part II-C(ii), pp. 135–37.

NOTES: Method A: nine-point moving average. Method B: nine-point moving average applied twice.

converge to as close to one as desired. It is found empirically that convergence always occurs. Numbers of persons at single years of age are found by interpolating (e.g., linearly) the final adjusted numbers of persons at ages that are multiples of five.

Similarity of Feeney's Method to a Nine-Point Moving Average

Let us consider the implications of Feeney's requirement that Δ_x converge to one. If $\Delta_x = 1$, equation 5 implies that

$$\tfrac{1}{9}(P_{x--} + P_x + P_{x+}) = \tfrac{1}{8}(P_{x-} + P_{x+}) \qquad (11)$$

The quantity on the left is a nine-point moving average. The quantity on the right is an eight-point moving average that includes the same numbers except for P_x. For the two quantities to be equal, the final adjusted value of P_x must be equal to a nine-point moving average of the final adjusted values of P_{x-}, P_x, and P_{x+}. This suggests that a nine-point moving average procedure, or repeated application of a nine-point moving average procedure, might yield approximately the same results as the Feeney procedure.

Application

We applied Feeney's method to the recorded census age distributions of India for 1971 and Tanganyika for 1967. Also, these age returns and those of Indonesia for 1971 (Feeney's example in his original article) were graduated by a simple nine-point moving average (Method A) and by applying a nine-point moving average twice (Method B). The recorded and graduated age distributions obtained from these three methods are presented in tables 1–3. The tail frequencies of the distribution derived by Method A were obtained by adding the four adjacent single-year values (observed) on the extremes to the respective average of the nine terms centered at the middle. That is, the adjusted number at 0–4 was obtained by adding the recorded numbers at ages 0, 1, 2, and 3 to the nine-point moving average at age 4 (4 being the earliest age for which a nine-point moving average can be computed). The adjusted number at 80–84 (table 1) was similarly obtained by adding the recorded numbers at ages 81, 82, 83, and 84 to the nine-point moving average at age 80 (80 being the latest age for which a nine-point moving average can be computed). The recorded single-year values at 0–3 and 81–84 were similarly used in the second application of the moving average procedure in Method B. The number at 85+ (75+ in the case of Indonesia) is left unadjusted.

Column 6 in each of the tables shows the percentage difference between the recorded series and the adjusted series produced by Feeney's procedure. Columns 7 and 8 give the percentage differences between the adjusted series obtained by the Feeney method and the adjusted series obtained by Method A or Method B. A comparison of column 6 with columns 7 and 8 in each of the tables reveals that, with few exceptions, the percentage differences presented in the latter two columns are much smaller in absolute terms than the comparable percentages given in column 6.

Figure 1 allows a visual comparison of the adjusted age distributions (in percent) in five-year age groups for India for 1971. It is evident that, aside from a few tail frequencies, the

Table 2. Recorded and Adjusted Age Distributions of Tanganyika, 1967

Age	Recorded Population (in '000)	Adjusted Population (in '000)			Percentage Difference		
		Feeney Method	Method A	Method B	Recorded and Feeney Method	Feeney and Method A	Feeney and Method B
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0–4	2,141	2,142	2,140	2,128	− 0.05	+0.09	+0.65
5–9	1,884	1,859	1,842	1,825	+ 1.33	+0.91	+1.82
10–14	1,222	1,337	1,301	1,344	− 9.41	+2.69	−0.52
15–19	1,060	1,062	1,069	1,074	− 0.19	−0.65	−1.12
20–24	897	977	971	974	− 8.92	+0.61	+0.30
25–29	1,004	922	944	914	+ 8.17	−2.38	+0.86
30–34	734	777	786	777	− 5.86	−1.15	0
35–39	657	596	608	608	+ 9.28	−2.01	−2.01
40–44	439	476	468	479	− 8.43	+1.68	−0.63
45–49	473	410	412	408	+13.32	−0.48	+0.48
50–54	347	335	339	332	+ 3.46	−1.19	+0.89
55–59	206	235	237	244	−14.08	−0.85	−3.80
60–64	216	181	192	188	+16.20	−6.07	−3.80
65–69	146	140	139	143	+ 4.11	+0.71	−2.14
70–74	118	115	119	122	+ 2.54	−3.47	−6.08
75–79	145	120	120	127	+17.24	0	−5.83
80–84	98	96	96	95	+ 2.04	0	+1.04
85+	159	159	159	159	—	—	—
Not stated	6	6	6	6	—	—	—
Total	11,952	11,945	11,948	11,947	—	—	—

SOURCE: Base data are from United Nations, 1972, *Demographic Year Book 1971,* New York, 182–83.

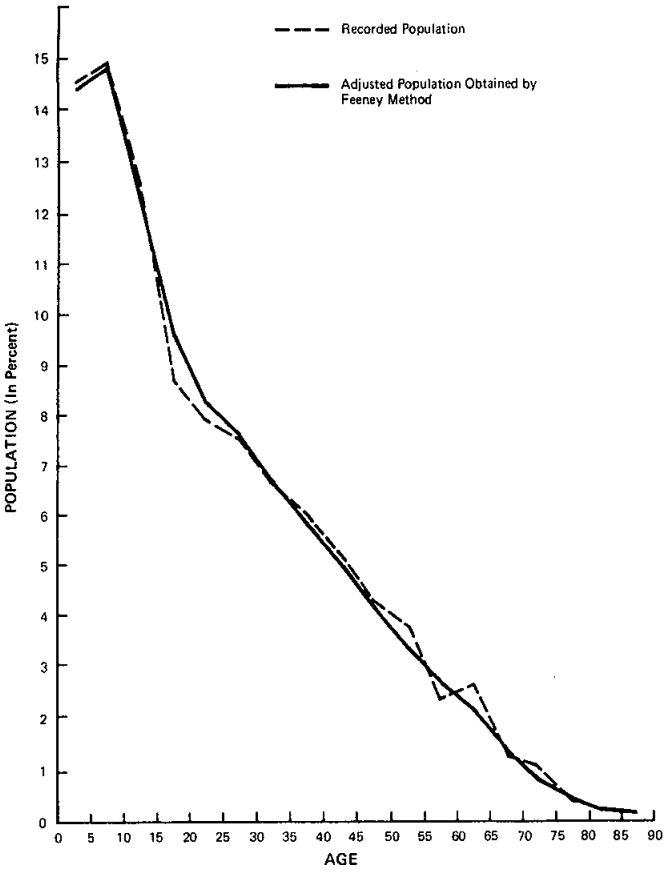
NOTES: Method A: nine-point moving average. Method B: nine-point moving average applied twice.

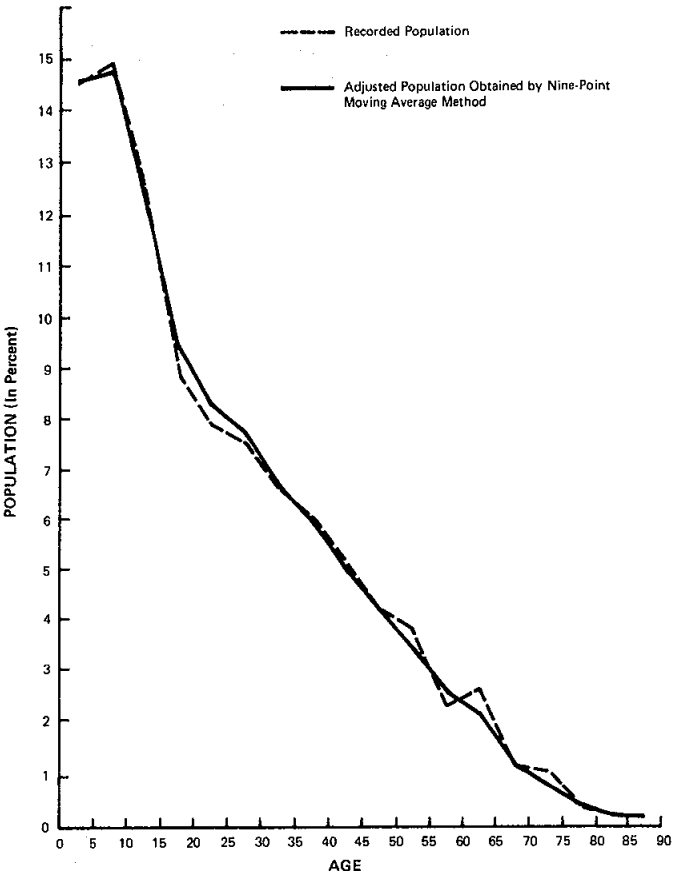
Table 3. Recorded and Adjusted Age Distributions for 22 Indonesian Provinces, 1971

Age	Recorded Population (in '000)	Adjusted Population (in '000)			Percentage Difference		
		Feeney Method	Method A	Method B	Recorded and Feeney Method	Feeney and Method A	Feeney and Method B
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0–4	18,100	18,004	18,007	17,934	+ 0.53	−0.01	+ 0.38
5–9	17,841	17,351	17,498	17,281	+ 2.75	−0.84	+ 0.40
10–14	13,550	14,018	13,876	13,931	− 3.45	+1.01	+ 0.62
15–19	10,782	10,927	10,850	10,913	− 1.34	+0.70	+ 0.12
20–24	7,585	8,837	8,842	8,959	−16.51	−0.05	− 1.38
25–29	8,477	8,145	8,334	8,228	+ 3.92	−2.32	− 1.01
30–34	7,524	7,823	7,892	7,794	− 3.97	−0.88	+ 3.70
35–39	7,624	7,029	7,104	6,963	+ 7.80	−1.06	+ 0.93
40–44	5,829	5,748	5,629	5,661	+ 1.39	+2.07	+ 1.50
45–49	4,448	4,326	4,315	4,351	+ 2.74	+0.25	− 0.57
50–54	3,689	3,289	3,235	3,267	+10.84	+1.64	+ 0.66
55–59	2,124	2,415	2,332	2,410	−13.70	+3.43	+ 0.20
60–64	2,226	1,794	1,831	1,793	+19.41	−2.34	+ 0.05
65–69	1,081	1,197	1,139	1,403	−10.73	+4.85	−17.21
70–74	987	982	983	979	+ 0.51	−0.10	+ 0.31
75+	745	741	745	745	—	—	—
Not stated	15	0	15	15	—	—	—
Total	112,627	112,626	112,627	112,627	—	—	—

SOURCE: Columns 2 and 3: Feeney 1979. Base data for the remaining columns are from Indonesia, Central Bureau of Statistics, 1974, *1971 Population Census,* ser. E, nos. 1–26, table 01, pp. 1–4 in each volume.

NOTES: Method A: nine-point moving average. Method B: nine-point moving average applied twice.





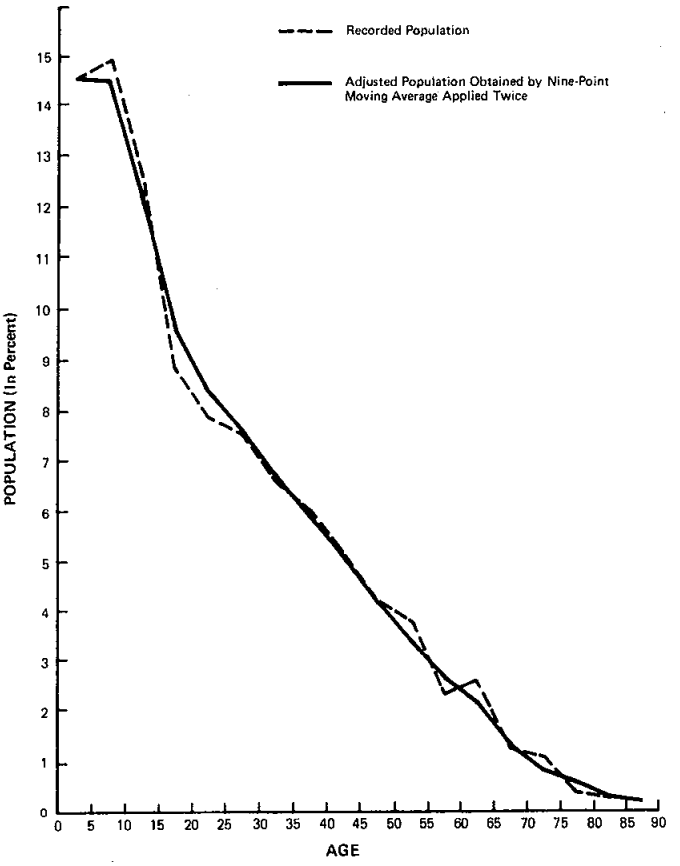


Figure 1. Recorded and Adjusted Age Distributions of India, 1971 (SOURCE: Table 1, columns 2–5 expressed as percent of total population.)

adjusted age distributions yielded by the simple nine-point moving average applied once and twice show close agreement with that produced by Feeney's procedure. Similar observations can be made for the adjusted age distributions of the other two countries, Indonesia and Tanganyika, graphs for which are not shown. It is evident from figure 1 that all three methods perform about equally well. Therefore, of the three procedures, Method A is to be preferred because it is the simplest to apply.

Discussion

In responding to Gould's (1979) and Malaker's (1980) comments on his original paper, Feeney (1980) replied that his approach has the advantage of specifying a rationale (equations 1–3), whereas the graduation techniques recommended by Gould and Malaker, as well as Methods A and B in this paper, do not specify a rationale and are more mechanical. This is true. But Feeney's procedure is also rather mechanical, and it is especially unsatisfactory at the 0–4 and open-ended age groups (which in most countries of South Asia are known to suffer from large systematic errors) resulting in reported numbers that are much too low at ages 0–4 and much too high at ages 85+ (see, for example, Retherford and Mirza 1982). None of the methods considered here, which focus on heaping on multiples of five, address these kinds of systematic errors, which often pose more serious analytical problems (e.g., for census-derived fertility estimates) than heaping on multiples of five. We do not claim that a moving average procedure is always suitable for smoothing or adjusting age data, but only that it produces much the same result as Feeney's more elaborate procedure. □

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CHINA WORKSHOP *(continued from page 4)*

status over several decades. The census collected 1981 fertility data and statistics on children ever born and children surviving for women aged 15–64; the survey obtained detailed birth histories for women 15–67 and data on contraceptive use and possession of a single-child certificate.

Thus, while the census provided detailed data on marital status at the time of the census, the survey provided series data for the study of changes in marital status. Furthermore, because the birth history provided both the year when a baby was born and the age of the mother at birth, data derived from the survey can be used to examine the cohort performances of fertility and the reproductive behavior of different cohorts in the same year.

Xiao said the fertility survey was very representative of the census population not only for the whole country but also for regions. Both nationally and by region, the census and survey were very close in number of births counted and the crude birth rate implied. The census and survey total fertility rates and fertility by parity were in high agreement also.

However, Sidney Goldstein emphasized how problematic it was that the census and survey used different definitions of urban. The census defined urban in a new, more internationally comparable way: it counted everybody within the urban boundaries as an urban person. The survey used the old urban definition; that is, only nonagricultural people with permanent registration status in cities and towns were counted as urban. As a result, the census urban data refer to 21 percent of the population, while the fertility survey urban data refer to only the most urbanized 14 percent of the population.

On another topic, Xiao pointed out an anomaly in the data on cumulative fertility rates for 1981 by age of woman: the fertility survey shows higher cumulative fertility by each age of woman than the census. He said the causes of this discrepancy were yet to be determined.

Data Analysis

Fertility

William Lavely, a scholar at the University of Michigan's Population Studies Center, used the data from the fertility survey and a fertility analysis technique devised by Ansley Coale to examine the transition from uncontrolled to controlled fertility. He compared the measured marital fertility to natural fertility (the fertility pattern in the absence of any contraception) for both rural and urban areas. In one of the high points of the conference, Lavely described Coale's technique in Chinese.

What Lavely found in the course of his study was that Coale's model works well for analysis of fertility in the 1950s and 1960s. His results suggested that there was some attempt to control fertility in the urban areas of China even in the fifties. But he discovered that the model ceased to fit in the middle seventies when contraceptive use reached a high level of saturation and fertility became very low.

Zha Ruichuan, a demography professor at the People's University in Beijing, presented a thorough compilation and analysis of fertility data from the registration system, the National Fertility Survey, and the census.

He noted that the crude birth rate in China is higher than in such countries as the United States. Although some people have argued that the main reason for this is China's age structure, Zha said the proportion of women in the childbearing ages is actually lower in China than it is in the United States and Japan. Therefore, he said, the higher crude birth rate must be associated with higher fertility. That is, Chinese women still have higher fertility than women in the U.S. or Japan.

He showed a graph of the age-specific fertility patterns of Japan and China. Interestingly, while Japan's fertility is lower than China's they have almost exactly the same age pattern of fertility. That was not true in 1970. China in 1970 had a broad-peak pattern of fertility, which means that women started childbearing early and that the fertility level stayed high from the early twenties through the late thirties. The change between 1970 and 1981 was not only a decline in fertility, but a contraction of the fertility schedule such that most fertility comes to women in their twenties. An extremely high peak in the middle and late twenties is characteristic of both China and Japan.

Zha argued that this is a characteristically East Asian developed pattern of fertility. He showed that the European countries, though they have low fertility, have a different peaking point. That is, the peak is at about 21 or 22, and in Japan and China fertility peaks several years later.

Zha discussed the slight rise in China's total fertility rate in 1981. Fertility had fallen to its lowest point ever in 1980, but then rose in 1981. The family planning authorities and the government authorities thought that the reason for this rise was that the family planning program was not being enforced strictly enough, that the family planners were getting lax. They also attributed it to the recently adopted production responsibility system in agriculture, which weakened the family planning control mechanisms by making children more valuable as laborers on the family farms.

However, Zha pointed out that the main reason for the rise in fertility was not an increase in higher order births, which is what you would expect if people were not adhering to the one-

Zha Ruichuan, Ansley Coale, and Griffith Feeney exchange views during a coffee break.

child rule. Instead, almost all—75 percent—of the rise was an increase in first order births.

Zha suggested some reasons for the increase in first order births: First, a new marriage law became effective 1 January 1981, which allowed earlier marriages than had been allowed in the 1970s. Consequently, there was a surge of marriages in the first half of 1981, and a surge of first births followed in late 1981 and 1982.

Second, young women aged 23–27 whose marriages and childbearing had been postponed also had a dramatic increase in fertility. But again, these were first births.

Ansley Coale pointed out during the discussion that during the entire 1970s decade the age at marriage had been rising rapidly. When the age at marriage is rising, the birth rate is suppressed—births that normally happen in a particular year happen in a later year instead. Thus there is a stretching out of the births, which means that the crude birth rate drops. The period total fertility rate is also depressed by a sharply rising marriage age. As soon as the age at marriage stops rising, the depressing effect is lifted and the birth rate and total fertility rate will tend to rise.

Thus the total fertility rate was going to rise anyway, because the marriage age stopped rising. But in addition the marriage age declined because of the change in the marriage law and this amplified the effect.

Marriage Patterns

Liu Changhong confirmed Coale's assessment of the marriage trend. Using the census and fertility survey data, she calculated the average age at first marriage for both men and women by province and the average age at first marriage for women from 1950 to 1982. Her results showed that age at first marriage for women rose steadily from about 1950 to 1980, but decreased somewhat after 1980. They also showed that, in some provinces, the average marriage age for males was as much as four years higher than the average marriage age for females. The difference varied considerably between provinces.

Liu also calculated the proportion of the population in each province that married below the minimum marriage ages stipulated in the marriage law. Since women who marry younger than the legal age also tend to have their births early, contrary to the government's policy encouraging late births, this is considered an important problem. As would be expected, the provinces with the highest incidence of early marriage were those with large minority populations who are not bound by the same minimum marriage ages.

Peter Smith compared China's marriage pattern with the marriage patterns of other Asian countries. He analyzed two aspects of the marriage pattern: the prevalence of marriage and marriage timing. He showed the changes over long periods and concluded that, for the most part, China's experience falls near the middle of the range of experiences of other Asian countries. Among females for China and most of the other countries analyzed, rising age at which marriages begin to occur and slowing pace at which the proportion married reaches its maximum have both contributed to delayed mean age at first marriage. Among males, the age at which marriages begin to occur has risen everywhere, but the pace at which the proportion married reaches its maximum has increased, especially in China but in almost all the other countries as well. Consequently there has been a greater change in the statistical mean age at marriage for females than for males in all the countries in Smith's study.

Mortality

Jiang Zhenghua reported on his efforts to estimate mortality from the census data. He used the Feeney technique of estimating infant mortality from the census children-ever-born and children-surviving data.

Jiang described China's mortality since 1949 as follows: From 1949 to 1959 was a period of rapid mortality decline—the standardized crude death rate dropped from about 20 per thousand to 10 per thousand. Next came a period of economic difficulty, 1960–63, during which the crude death rate rose. From 1964 to the present, the death rate declined again, this time at a much slower pace. He estimated that deaths were 93 percent registered during the intercensal period 1964–82.

Jiang's paper reported the infant mortality rates from 1982 census data for 18 or China's 29 provinces and presented some parameters of the life tables he had created for six administrative regions of China. He provided life expectancy at birth, infant mortality, and expectation of life at different ages for the regions, based on 1982 census questions.

Judith Banister's paper began with the observation that because of the very high quality of the census and survey data, the sex ratios by age can be assumed correct and can be assessed for their significance. It then asked why China's sex ratio (the number of males per 100 females) was higher than the sex ratios of most countries of the world in 1982. This question led into a discussion of the historical and recent selective neglect of girls and women in Chinese, South Asian, and East Asian cultures. The discussion showed how the sex ratios can reflect this neglect. Part of her analysis was derived from the assumption that China, like other East Asian countries, has a sex ratio at birth in the range 105.0–107.2.

Jiang Zhenghua argued that too little is known about sex ratios at birth to conclude that China's population sex ratio is evidence of anything unusual. For all anyone knows, Jiang said, China's sex ratio at birth is truly 108.5 as indicated by the census.

Banister, along with Ansley Coale, replied that experience has shown that once the random variation caused by small sample size is overcome, the sex ratio will be 105–107 in every country of the world except the black African countries. Whenever a sex ratio at birth has been outside of 105–107 for a large population over a sufficient period, the data have been in error. Coale cited Taiwan as an example: in the 1920s the sex ratio at birth was reported to be 112, but as the data improved, it got down to between 105 and 107. Apparently girls had not been recorded properly in earlier surveys.

Banister's paper said that the high total population sex ratio seems to have been caused by pre-1949 female infanticide and selective neglect of girls, continuing discrimination against girls aged 1–6 up to 1964, and the low mortality achieved by the 1970s (which permitted the sex ratio at birth of about 106 to be held until the mid-teenage years even if slight mortality differentials remained). These conclusions are evident from the sex ratios at individual ages calculated from the census data.

Urban and Labor Force Data

Sidney Goldstein closely examined the available urban-rural data in order to assess the level of urbanization in China. Sun Jingxin noted that Goldstein's analysis was of unprecedented depth and scope, and even the State Statistical Bureau had not yet been able to devote the staff time to undertake such detailed analysis of urban statistics.

Goldstein introduced his topic by explaining that the Chinese government has given considerable attention to problems related to the rural-urban distribution of the population, to the rates of urban growth, and to the relations between employment opportunities and rural and urban development. China's officials consider efforts in these areas to be of critical significance for the future development and modernization of the nation, and their concerns have led to the emergence of a firm policy regarding population movement and distribution.

For decades China's basic urbanization policy has been to strictly control the expansion of big cities and rationally develop the medium sized ones, a policy still in effect. Recently the government has added vigorous efforts to build up small cities and towns. Such a policy is premised on the belief that the close linkage of industry and agriculture in smaller cities and towns will allow fuller use of local natural resources, raw materials, and manpower. These small urban places are expected to absorb the surplus rural labor force resulting from the combined effects of population growth and the introduction of the responsibility system in agriculture.

Goldstein pointed out that because the 1982 census was taken at about the same time the new policy was implemented, the census data will provide baseline information on the structure of the urban hierarchy. Using the 1982 data, later surveys and censuses will be able to assess the changes resulting from these policies and to evaluate their success.

He mentioned that the census definition of urban is better than previous definitions of urban in China but that, unfortunately, the census and the fertility survey did not use the same definition. This presents a serious problem for analysis of the two sets of data: they are not comparable in the urban-rural breakdowns. The new definition will, however, make the census data more comparable with other countries' data.

One of the things that came up in discussion was an anomaly in urban data for the early 1960s. With the collapse of the Great Leap Forward, millions of urban residents were relocated to rural areas, creating a dip in the 1962–63 urban population statistics. A spurt of growth followed in 1964 that is not clearly explained by the available data.

During the discussion, Banister suggested that the dip in the number urban in 1962–63 is merely a statistical aberration. Sun Jingxin said that some of the people ordered to return to rural areas after the Great Leap Forward did not, but were not counted in the 1962–63 urban population either. The State Statistical Bureau has gone back to mid-year 1964 and adjusted annual urban population figures for 1964–81 in an attempt to make them consistent with the 1982 census definition. Figures for earlier years are old figures, completely unadjusted, hence the discontinuity between year-end 1963 and mid-year 1964. The State Statistical Bureau is in the process of applying the new definition to the pre-1964 data.

Sen-dou Chang did a classic geographical analysis of China's urban population data using primacy indexes and the rank-size rule. He chose to use the old definition of urban for his analysis because, under the new definition, some mining towns and newly established cities have been called urban when they are not really urbanized, but rather are large agricultural areas with little urban concentrations scattered within them. He decided to go back to the nonagricultural population to get a real urban total (20.6 percent of the population was classified urban by the new definition, 14.2 percent by taking only the urban nonagricultural population). Chang thus identified a new problem, that of new industrial towns including large agricultural areas within their boundaries.

Chang said that, based on analysis using the primacy index, the policy to minimize the size and growth of the large cities and maximize the medium and small cities has had some success. Urbanization focused on small cities and towns is now being used to absorb excess labor from China's rural areas.

Jeffrey Taylor presented a paper on occupation, industry, employment, and unemployment in China. In 1982, for the first time, China's census used classifications of occupation and industry that were roughly comparable with international definitions. The labor force and the unemployed population, however, could not be clearly extracted from the data because of the way the employment questions were asked in the census.

Y. C. Yu explained that many other countries in addition to China utilize the concept of the employed population rather than the concept of the labor force for economic measurement.

Taylor grouped the Chinese data in the most likely ways, calculated unemployment rates by province, and talked about

the reasons why unemployment is highest in the northeast, the most industrialized part of the country, and lowest in the south and southwest, the most agricultural part of the country.

Minority and Provincial Data

Up until now, China's minorities have been largely exempt from marriage and family planning policies. The census provided some of the first data detailed enough to assess the demographic situation of minorities. Liao Baoyun, who did nationalities research in south China in the 1950s and who is now an ethnologist associated with the Chinese Academy of Social Sciences, compared his first visits to minority group areas with what he found when he went back in the 1970s and early eighties. In most cases he found a tremendous transformation; old customs had given way to new and he could hardly find a trace of some of the earlier traditions.

Looking at the census data, he found a wide range of population increases among the minority groups. Some have grown very rapidly while others have grown very slowly. The Korean minority, which is very advanced and highly educated, has had lower fertility over a longer period than the majority nationality, the Han Chinese. But the Koreans are an exceptional minority group, and most of the others are more backward with much higher fertility and somewhat worse mortality than the Han.

In view of this, Liao said, the government now considers it necessary to promote family planning among the minority groups. The feeling is that birth planning in China should not exclude minorities, and minorities living in the same conditions as the Han, at the same level of social and economic development, should conduct birth planning the same way the Hans do. On the other hand, minorities in different situations should not be forced to adopt the same fertility limitations applied to the Han but should practice family planning under rules more appropriate to their situations.

Nancy Dowdle attempted to assess the variation in fertility and mortality among China's minority nationalities. Because the published data did not report children ever born and children surviving by age of mother for each minority and did not report 1981 deaths by minority group, Dowdle used a combination of demographic techniques to estimate from the age structure and available mortality information the expectation of life at birth for each minority.

She took these data and other available data and used a robust fertility-estimation technique created by Ansley Coale to estimate the average birth rate over the 15-year period prior to the 1982 census for 32 minority groups. This yielded estimates of the great differences in fertility among these groups.

Because of the complex manipulation of the data required to produce the estimates in the report, results are merely preliminary. But according to Dowdle, the significant differences between groups and the overall range of fertility and mortality indicate that each ethnic group has distinctive cultural characteristics, including a particular kind of demographic behavior, and that the convergence of these traits among the groups has not occurred in China.

The Koreans, Zhuang, She, and Hui have the lowest fertility and mortality levels of all the ethnic groups; their birth rates are below 32 per thousand and expectation of life at birth is above 55 years. These populations have already begun the fertility and mortality transition to lower rates, and some fertility control is occurring. Most of the minority nationalities, however, belong to the class of high fertility (up to 50 births per thousand population) and high mortality (expectation of life at birth as low as 38 years) populations.

H. Yuan Tien's paper examined provincial differences in population growth during the two intercensal periods 1953–64 and 1964–82. He also assessed the implications of 1982 census age structures reported for several provinces. There was strong support for the concept of looking at China on a provincial basis. Many provinces are larger than most countries of the world. They deserve analysis in their own right given the huge size of their populations.

Education

Tuan Chi-hsien, Xiao Zhenyu, and Yu Jingyuan called the participants' attention to a very important problem. Since 1977, educational enrollments have leveled out, which one might assume was the result of fewer children coming into the primary school ages because of the recent fertility decline. But Tuan et al. calculated the proportion of the change in enrollment that is due to declining fertility and declining number of children reaching school age, and the proportion due to an actual deterioration in school attendance. The authors were able to show that there was real deterioration in attendance, particularly at the middle school level, but also at the primary school level.

Tuan, Xiao, and Yu suggested that this deterioration was a side effect of the recently introduced production responsibility system, which increases the value of a child's labor at home or in the family's fields. Under the previous system, the commune set up the schools and required school participation. In many provinces such a requirement is not rigorously enforced today. However, it was reported that in 1984 the People's Congress in Jiangsu passed a law requiring parents to send their children to elementary school and provided means for enforcement.

Lin Keming presented some preliminary results of his study of the educational level of Beijing's population. Lin's paper sparked a lively discussion about urban education and education in Beijing in particular. Beijing is the country's foremost university center with over 20 percent of the country's major universities and about one-third of China's total college enrollment. Many people come from outside Beijing to be educated.

Census-Based Population Projections

One of the reasons for taking the census was to get good baseline data on population size, mortality, and fertility for future projections. Several papers were presented testing the effects that different fertility policies would have, if they were successful, on China's future population size and age structure. A variety of goals for population policy are possible: a specified peak population, a specified stable population, a certain population in the year 2000, or an acceptable dependency ratio or ratio of old to working-age population.

Yu Jingyuan, along with coauthors Tuan, Xiao, Wang, and Huang, used a deterministic discrete model, a stochastic model, and a parity model to project China's population assuming a variety of patterns of total fertility rates (TFR) for urban, rural, and minority populations. With two patterns of TFR for urban, five for rural, and two for minorities, 20 combinations of patterns were used to project total population, rate of natural increase, and an aging index for the period 1982–2040. The authors stated that a TFR under replacement level cannot be maintained too long because of the severe future aging of the population associated with extremely low fertility. Therefore they assumed a TFR of two or more births per woman after the year 2000 in all the projections.

Kyeng-Cheng Han's paper with Lee-Jay Cho, Griffith Feeney, and Qinghua Zhao, used a control theory model to test different methods of reaching an assumed optimum population size. An arbitrary figure of 700 million was chosen as the target, a choice that sparked a lot of debate because of its roots in early projections of optimal population done by a Chinese team. Much higher figures are now being considered for China's optimal population.

The procedure modeled the various ways that fertility could be altered over time to get to the final destination. The target was a stationary population of the given size. The total fertility rate was varied to simulate planned-birth policies to achieve different levels of fertility. Peak population, proportion aged, and year stability would be achieved were the results observed.

The discussion focused on which of several scenarios was most desirable from a policy perspective and yet also feasible. One projection assumed that the TFR could be reduced to 1.6 births per woman in the 1990s, raised to 1.8 early in the next century, dropped to 1.3 in 2030, and then raised above replacement level. The authors estimated that this would result in 21 percent of the population age 65 and above in the middle of the next century, a manageable proportion.

Ansley Coale and others suggested that this analysis should be redone using various end populations. Coale argued that the ideal population could just as easily be 1.3 billion because we can't know what technology will bring 100 years from now or what the carrying capacity of a country will be.

However, there was a strong reaction against that argument from some of the other participants. Tuan Chi-hsien pointed out that what Coale was describing was essentially the Chinese policy of the 1950s, when population growth continuously outpaced technological improvements. He said that because we don't know what the future holds, good or bad, we must adopt policies to deal with what we know now.

John Aird presented five projections that he had made, four assuming different family planning policies and one aiming for a specific stable population. Aird examined the peak populations, years and levels of stabilization, and dependency ratios implied by his assumptions.

One of Aird's projections was particularly interesting. He modeled the effect of adopting a policy allowing each family to have one son. The purpose of this policy, he said, was to minimize female infanticide. The policy would permit each couple to continue having children to a maximum of five until they had a son. He calculated that such a policy would result in a total fertility rate of 1.9 births per woman, a peak population of 1.36 billion, and a stable population of 1.25 billion. This compares with a TFR of 1.5 and a peak population of 1.21 billion in his projection to achieve a stable population of 900 million.

Summary

The mood of the conference can perhaps best be summed up by a comment made by Vice Premier Yao Yilin at a similar conference held in Beijing in March 1984. On that occasion Vice Premier Yao said, "We all came here as new friends, but in a very short period of time we became old friends, and old friends can speak openly and know that they are still good friends even if they disagree." This sentiment was echoed in the concluding remarks of many of the participants in Honolulu, and the attitude was apparent throughout the conference. Discussions were frank and open, and, in the case of some of the more controversial topics, even heated. The result was a free and lively exchange of ideas.

The non-Chinese scholars left their Chinese colleagues with several suggestions. Among these were requests that tables of age-specific fertility by minority group be produced; that urban-rural tabulations be broken down by cities, towns, and rural areas; and that a public use sample tape—a tape containing a representative sample of the census questionnaires—be made available. These suggestions were accompanied by expressions of profound respect for what the Chinese had accomplished in the census and fertility survey.

The Chinese participants noted that the conference strengthened understanding through the sharing of experiences. They expressed their gratitude for the help and concern of their foreign colleagues. Zha Ruichuan noted that it was an exciting conference that permitted participants to argue in order to make facts clear. He said it achieved unexpected success in founding and enhancing friendship and expressed his hope that his American colleagues would continue to study his country because their study benefits both Americans and Chinese.

Commented Sun Jingxin, though the census achieved great success there is much left to do, and the ultimate success depends on both financial and technical help from friends. With respect to future censuses, Sun said the Chinese would evaluate their census, weigh the benefits against the costs, and make improvements. Attention will be given to the design of the questionnaire, improvement of sampling, and the possibility of using both a long and a short questionnaire in the next census.

The 1982 census of China was not like other censuses: it covered 22 percent of the world's population and filled a gaping hole in our understanding of the global demographic situation. And the conference was not like other conferences: it brought together scholars and statisticians from China and the U.S. in an unprecedented display of collaboration and cooperation. It served as a forum for the promotion of interagency cooperation among organizations within China and for collaboration with organizations and scholars outside China. □

ENUMERATIONS

AUSTRALIA

The Australian Bureau of Statistics reports that John Paice has replaced Brian Doyle as director of the Development and Evaluation and Field Section (formerly Evaluation and User Services). □

Over at the Australian National University, Geoff Corner of the International Population Dynamics Program, Department of Demography, has proposed that a special interest group be set up in Canberra by those interested in using microcomputers for the preparation, execution, and analysis of surveys or for other statistical analysis.

The group would make contact with similar groups and act as a clearinghouse for information. Two proposed projects for the group are to prepare a standard format for assessment of statistical packages and to transcribe the information from available sources. Membership is open to researchers in all disciplines, including overseas researchers.

Corner has already prepared a list of 36 statistics packages from magazine advertisements, abstracts, reviews, and data received from suppliers. An overview of his research on statistics software for microcomputers has been published as Research Note No. 33 by the International Population Dynamics Program, Department of Demography, The Australian National University (Canberra, ACT, Australia).

Interested persons are invited to write to

Geoff Corner
P.O. Box 17
Pearce, ACT
Australia 2607 □

SRI LANKA

W. A. A. S. Peiris recently retired from his position as director of the Department of Census and Statistics. The new director is W. S. M. Fernando. □

THAILAND

Niyom Purakam has taken over as secretary-general of the National Statistical Office, replacing retiring Ambhorn Arunrangsi. Also, we recently learned some old news—that Wiwit Siripak is the official director (and no longer acting director) of the Population Survey Division of the NSO. □

BANGLADESH

A. B. M. Gulam Mustafa, Secretary of Health and Population Control, reported that Bangladesh's crude birth rate now stands at 40 per thousand and its crude death rate at 15.6 per thousand, resulting in a 2.4 percent annual growth rate. The announcement came at the two-day National Conference and Workshop of Chairmen of Municipalities in Dhaka.

In the inauguration statement to the conference, Major General Shamsul Huq, Minister for Health and Population Control, revealed that in Bangladesh during the period 1983–84 more success was achieved in the field of family planning than in the last ten years.

The conference was organized by the Ministry of Population Control in cooperation with the local government ministries and the Pathfinder Fund to examine different aspects of municipality organization and function with regard to mother care, child welfare, and family planning in order to establish closer links between the people's representatives and the family planning field staff.

It was pointed out that in recent years the rate of population growth has been higher in municipal areas than in villages because of the influx from the rural areas, and thus cooperation of the people's representatives has become all the more necessary to help control the birth rate among migrants and people living in slums. [Press release of the Directorate of Population Control, in *Population Headliners*]

PAPUA NEW GUINEA

Reg Gilbert recently returned to Papua New Guinea's National Statistical Office. He has accepted an appointment as assistant national statistician. Gilbert was the census director for Papua New Guinea's 1980 census. □

PHILIPPINES

Tito A. Mijares is leaving the National Census and Statistics Office to become the director of the Statistical Institute for Asia and the Pacific in Tokyo. Raja Bertram Maligaspe Korale will replace Mijares as census director at the NCSO in Manila. □

SINGAPORE

The International Planned Parenthood Federation's *People* magazine reports that Prime Minister Lee Kuan has stated that the country's population growth has become "lopsided" because Singapore's strict population control program has worked better among wealthier, educated women than among poorer women.

In order to correct this perceived social imbalance in fertility, powerful incentives have been offered to the less educated to undergo sterilization. Thus women with no diploma and family incomes less than S$1,500 per year will be offered a truly large sum—S$10,000—if they are sterilized after their first or second birth.

While some other nations (such as the Soviet Union and West Germany) are concerned to some degree with more rapid population growth among minorities, Singapore's recent policies may be the harbinger of "differential" family planning policies. [*Population Today*, Population Reference Bureau, Inc.]

NEPAL

In Nepal, B. R. Regmi has been appointed director general of the Central Bureau of Statistics, replacing S. B. Srivastava. □

PUBLICATIONS THAT COUNT

by Alice D. Harris

Nathan Keyfitz and John A. Beekman. *Demography Through Problems.* New York: Springer-Verlag, 1984. viii + 141 pp. US$28. ISBN 0-387-90836-6.

The authors of this book regard it as "an experiment in the teaching of population theory and analysis." By presenting the reader with a set of mathematical problems to solve they hope to involve him or her as an active participant in demographic analysis. The problems are presented by topic and include population projections, the life table, stable age distributions, births and deaths under stability, forecasting, and stochastic population models.

Each chapter contains a brief introduction to the theory behind the topic, followed by a sequence of problems that illustrate this theory and, in most cases, solutions to the problems. The presentation differs from standard texts such as *The Techniques of Demography* by William Barclay or *The Materials and Methods of Demography* by Henry Shryock and Jacob S. Siegel. There is less emphasis on description and more on practice in working out theory through problem-solving.

Readers should have a thorough knowledge of mathematics—especially algebra—and a good calculator to work through the problems. The book could be used in classes in biostatistics, sociology, and the actuarial sciences. It can be used as the only text in courses on demographic analysis, or with other materials in introductory population courses. Many of the problems have been tested in actual classes and refined to work out the ambiguities. Real data from statistical sources like the U.S. Census Bureau can be used for working out the problems. *Demography Through Problems* is a worthwhile book for individuals studying population dynamics as well as for libraries. It should be available through your local book dealer.

Fertility in the Philippines: Further Analysis of the Republic of the Philippines Fertility Survey 1978. Edited by Luisa T. Engracia, Corazon Mejia-Raymundo, and John B. Casterline. Voorburg, Netherlands: International Statistical Institute, 1984. xi + 222 pp.

This volume is the detailed analysis of the information collected and published in the Republic of the Philippines Fertility Survey in 1979. That work was carried out as part of the World Fertility Survey program, which endorsed further in-country analyses of WFS data to supply answers to a number of questions asked by researchers after the completion of the country reports.

Alice Harris is Research Information Specialist of the combined collections of the Environment and Policy, Population, and Resource Systems Institutes at the East-West Center. This Resource Materials Collection includes a sizable body of census publications and serves as a training center for Asian and Pacific population librarians. Review copies of new publications of interest to readers of the Census Forum *may be sent to Ms. Harris at the EAPI/PI/RSI Resource Materials Collection, East-West Center, 1777 East-West Road, Honolulu, HI 96848, USA.*

The National Census and Statistics Office and the Population Institute, University of the Philippines, cooperated in the analysis necessary to provide this volume, which covers such topics as nuptiality, fertility levels and trends, fertility determinants, fertility preferences, family planning behavior, and infant and child mortality. A detailed evaluation of the quality of the demographic data in the country report was carried out and the results published as WFS Scientific Report No. 19 before the writing of the various reports included in this volume.

Fertility in the Philippines will be very useful to researchers within the Philippines and to others interested in Philippine population dynamics. This is an excellent example of what can result from analysis of the WFS data on a country basis. To obtain the book, contact the International Statistical Institute, 428 Prinses Beatrixlaan, P.O. Box 950, 2270 AZ Voorburg, Netherlands.

Fertility in Pakistan: A Review of Findings from the Pakistan Fertility Survey. Edited by Iqbal Alam with assistance from Betzy Dinesen. Voorburg, Netherlands: International Statistical Institute, 1984. xi + 259 pp.

Another country that has assembled the results of detailed analysis of data from its WFS country report is Pakistan. Iqbal Alam has assembled ten research reports on various topics related to fertility and fertility-related behavior. The reports will provide new insights into Pakistani population growth. They have been written by Pakistani scholars on such topics as levels and trends in fertility, socioeconomic differentials in breast-feeding, the influence of community factors on individual behavior, the use or non-use of contraception, and the study of infant mortality in relation to fertility.

This volume should be welcome to those involved with national family planning efforts in Pakistan and should inspire other WFS country participants to publish similar reports. Ordering information is the same as for *Fertility in the Philippines.*

Determinants of Fertility in Developing Countries. Edited by Rodolfo A. Bulatao and Ronald D. Lee. 2 vols. New York: Academic Press, 1983. Vol. 1, xvii + 644 pp., US$37, ISBN 0-12-140501-X; vol. 2, xvii + 848 pp., US$45, ISBN 0-12-140502-8.

This comprehensive compilation of data on fertility determinants in developing countries was anticipated by scholars in the field of population long before it appeared in late 1983. The U.S. Agency for International Development commissioned the Panel on Fertility Determinants of the Committee on Population and Demography, National Research Council, to prepare a synthesis of research on the supply of and demand for children in developing countries. In recent years the committee has prepared a series of books on fertility, data collection, and data estimation (many of these were reviewed in earlier issues of the *Census Forum*). One of these was Manual X of the United Nations Population Studies series.

Determinants of Fertility is the product of more than 41 contributors from various disciplines: sociology, demography,

economics, psychology, and anthropology. The theoretical framework for the volumes is adapted from work done by Richard Easterlin. Chapters are organized under three broad headings: the supply of children, the demand for children, and fertility regulation. Since the demand for children seems to be the most important determinant, there are more chapters devoted to this topic. Each contributor presents a summary of the theoretical and empirical research relating to his or her topic. Every chapter has an excellent bibliography for those wishing to do more research, and many chapters contain suggestions for further study or lists of propositions that encompass ongoing research hypotheses.

The final chapter lists the 40 questions the panel felt to be the most important for future research on fertility. The topics have been selected because of their "potential contribution . . . to and increased understanding of fertility determinants" (v. 2, p. 795). Unfortunately, neither the chapters nor the conclusion emphasize the potential contributions of such research to family planning programs and policies. And these contributions are becoming increasingly important for obtaining research funds.

Despite this minor omission, there is no doubt of the importance of this two-volume synthesis of fertility data. It should be in university libraries as well as in special population collections, and most researchers will want their own copy. The price is high, US$82 for the set, but worth the expense for those who are involved in fertility research. In-depth reviews of the book have been written by Arthur Campbell (*Population and Development Review* 10:371–73, June 1984) and Jacqueline D. Forrest (*Family Planning Perspectives* 16: 199–200, July–August 1984).

Censuses of Asia and the Pacific: 1980 Round. Edited by Lee-Jay Cho and Robert L. Hearn. Honolulu: East-West Center, East-West Population Institute, 1984. xxiv + 380 pp. US$15. ISBN 0-86638-052-3, paper.

With the publication of this volume, the second of its kind, the editors—Lee-Jay Cho, director of the East-West Population Institute, and Robert L. Hearn, editor of the *Asian and Pacific Census Forum*—have made it possible to obtain information on the 1980 round of national censuses for Asia and the Pacific in one convenient location. The first volume, *Introduction to Censuses of Asia and the Pacific 1970–1974,* edited by Cho, covered 15 countries in the region. The new volume has been expanded to cover 19 countries, including the People's Republic of China. This reflects the increased importance attached to census-taking in the region.

Subjects covered in each country report include history and legal status of the census, organization of the census office, design and execution of the census, definitions employed in the questionnaire, data processing and tabulation, and publications. Also included is information on the census budget and timetable. A common outline has been followed in the organization of each section; this facilitates the comparison of information from one country to another. Readability is also enhanced by moving the questionnaires to appendices and by providing two tables at the front of the book that summarize the census characteristics and the questions asked country by country. An index of chapter subdivisions is located at the back of the book.

An important background to this work has been the nine international census conferences convened since 1972 under the aegis of the East-West Center in cooperation with Asian and Pacific organizations. Philip Hauser, in his foreword, cites the example of the ninth conference which was held in Tokyo, 1–5 March 1983. This conference was cosponsored by the Statistics Bureau of the Prime Minister's Office in Japan and the East-West Population Institute, with cooperation from the United Nations Economic and Social Commission for Asia and the Pacific and the Statistical Institute for Asia and the Pacific. Census officials and staff from the region met to share problems, methodologies, and data from their own national census experiences.

Censuses of Asia and the Pacific: 1980 Round, like the earlier volume, will appeal to a variety of readers. Reference librarians will be happy to find information on census-taking for Asia and the Pacific in one handy location, researchers and students will be able to ascertain in advance whether the census data for a country will meet their research needs, and policy-makers and businessmen will be able to determine which data can be utilized when planning social and economic policy. It is a valuable resource tool and one that can be obtained by writing to the Publications Office, East-West Center, 1777 East-West Road, Honolulu, Hawaii 96848. □

IN MEMORIUM KHUN ANURI

Mrs. Anuri Wanglee, former deputy secretary general of the National Statistical Office, died in Bangkok on 28 February 1985. She was 49 years old. Khun Anuri joined the National Statistical Office (NSO) in 1963 and served as director of the Population Survey Division for more than 12 years. She was the deputy secretary general of NSO from 1979 until 1981 when she became vice president of the Poonpipat Finance and Securities Co., Ltd. At NSO, she was in charge of planning, coordination, and analysis of all censuses and surveys related to population and social statistics, including the 1970 and 1980 censuses of population and housing, the Survey of Population Change, the Survey of Fertility in Thailand/World Fertility Survey, the Labor Force Survey, and surveys of migration, education, and children and youth. In addition to her responsibilities at NSO, she served on numerous Thai government committees related to population and family planning.

Khun Anuri was an active member of the international population community. She participated as a resource person or expert in numerous conferences sponsored by the United Nations, East-West Population Institute, International Union for the Scientific Study of Population, World Fertility Survey, and U.S. National Academy of Sciences. She was also a major contributor to the *Asian and Pacific Census Forum,* both as Thailand's correspondent to the *Forum* and as the author of several *Forum* articles.

Khun Anuri was well known to many *Forum* readers, who will remember her as both an esteemed colleague and a good friend. Those who had an opportunity to visit her in Thailand will always remember her boundless hospitality. She made many important contributions to the population field and she will be sorely missed. □