EXTREMELY RAPID AGEING AND THE LIVING ARRANGEMENTS
OF THE ELDERLY: THE CASE OF CHINA

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Populations are ageing, with changes in the living arrangements of the elderly occurring in most countries, as a result of lower fertility, higher mobility, changing attitudes about family structure and function, and increasing life expectancy, especially mortality declines in later life. The population of China, which consists of more than two fifths of the world total, is ageing at an extraordinarily rapid pace. There are important interactions between population ageing, changes in the living arrangements of the elderly and the need for long-term-care service. Such interactions are directly related to community and family support systems and public policies. The present paper reviews the extremely rapid ageing process and the current status and trends in the living arrangements of the elderly in China. Some policy recommendations are also proposed based on our analysis.

EXTREMELY RAPID PROCESS OF POPULATION AGEING

Fastest increase in proportion of elderly persons

Previous studies (e.g., Liang, Tu and Chen, 1986; Ogawa, 1988; Zeng, 1989; Grigsby and Olshansky, 1989; Zeng and Vaupel, 1989; Banister, 1990; Vaupel and Zeng, 1991; Zeng, 1994) show that, although the proportion of the elderly aged 65 and above of the Chinese population is not very high at the present time (5.6 per cent in 1990), the speed of population ageing will be extremely fast in the first half of the twenty-first century. Under medium fertility[1] and medium mortality[2] assumptions, the Chinese elderly aged 65 and older will account for 15.8 and 23.1 per cent of the total population by 2030 and 2050, respectively (Zeng and Vaupel, 1989; Zeng, 1994). The 1998 projections of the United Nations under medium fertility and medium mortality assumptions show that the Chinese elderly aged 65 and older would comprise 15.7 and 22.6 per cent of the total population in 2030 and 2050, respectively (United Nations, 1999b, p. 273). The medium variant of the United Nations projection is almost the same as our medium projection 10 years ago, which was performed independently and based on substantially different methodologies and base populations in various years.[3] Such consistency confirms that extremely rapid population ageing in China in the first half of the twenty-first

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century is definite—the proportion of the elderly population aged 65+ in 2050 will be more than four times higher than in 1990. The annual rate of increase in the proportion of the elderly population between 1990 and 2050 is 2.3 per cent.

In European societies, the ageing transition has been spread over one century or more. In China, however, this change will take place within a few decades and will reach more or less the same level of population ageing as in most of the developed countries by the the middle of the twenty-first century. The proportion of the elderly in China will increase much faster than in almost all other countries in the world. It will take about 20 years for the elderly population to increase from 10 to 20 per cent in China (2017-2037), compared to 23 years in Japan (1984-2007), 61 years in Germany (1951-2012), 64 years in Sweden (1947-2011) and 57 years in the United States of America (1971-2028) (United Nations, 1999b). Japan is regarded as a country with very rapid population ageing, but the ageing process of the Chinese population will be even faster than that for Japan (Ogawa, 1988). Table 1 gives the percentage of elderly persons aged 65 and above in 1990, 2030 and 2050 in selected countries. Figure I shows the average annual growth rates of the proportion of elderly persons between 1990 and 2050 in China and in selected developing and developed countries with large population sizes. By the middle of the twenty-first century, the proportion of elderly persons in China will be higher than that in the United States by 0.9 percentage points, and the average annual increase between 1970 and 2050 in China will be 2.6 times as high as in the United States. The anticipated proportion of the elderly population in China in 2050 is somewhat lower than in Canada, France, and the United Kingdom of Great Britain and Northern Ireland, and substantially lower than in Germany, Italy and Japan. But the annual increase of the percentage of the elderly population between 1990 and 2050 in China will be much higher than in the above-mentioned European countries and 44 per cent higher than in Japan.

(TABLE 1 HERE)

(FIGURE I HERE)

It is interesting to note that China is not alone with respect to extremely rapid population ageing among the developing countries. The proportion of elderly persons in the Republic of Korea will climb to a higher level with a larger annual increase rate than in China. Mexico and India, two developing countries with large population sizes, will also undergo very rapid population ageing at annual increase rates of 2.6 and 2.1 per cent, although their proportion of elderly persons in 2050 will be substantially lower than in China. The annual increases in the proportion of the elderly between 1990 and 2050 in China, India, Mexico and the Republic of Korea are all much higher than in European and North American countries. This fact deserves

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serious attention, not only in those developing countries, but also from international organizations and developed countries as well (Kinsella, 1988; Kinsella and Suzman, 1992; Martin and Kinsella, 1994).

Huge numbers of elderly persons

The very large size of the elderly population is another unique characteristic of population ageing in China. In 1990, there were 63 million elderly persons aged 65 and over. By 2030 and 2050, there will be 232 million and 331 million elderly people in China, respectively, under the medium mortality assumption, based on our projection (Zeng and Vaupel, 1989; Zeng, 1994). The most recent revision of the United Nations population projection forecasts that there will be 234.5 million and 333.6 million elderly persons in China in 2030 and 2050, respectively, under the medium mortality assumption (United Nations, 1999b, p. 273). Again, the surprising consistency of the projected total numbers of the elderly in China in the twenty-first century, produced independently by different scholars at different times, 10 years apart, following substantially different approaches, confirms the anticipated huge number of elderly persons in China in the twenty-first century.

Table 1 also gives the numbers of elderly persons in other selected countries, projected by the Population Division of the United Nations Secretariat (1999a, 1999b) under the medium variant. Under the medium mortality assumption, China's elderly population will be fairly close to the total population size of the United States, and 4.4 times as large as the United States elderly population by the middle of the twenty-first century. China's elderly population will outnumber India's by 103 million in 2050, while its total population size will be smaller than that of India by 51 million.

Even more extremely rapid increase of oldest old persons after 2020

Most younger elderly persons (less than 80 years old) are relatively healthy, but the oldest old usually need help. The oldest old consume amounts of services, benefits and transfers far out of proportion with their numbers. For example, in 1988, about a quarter of the Medicare payments to hospitals in New York City were on behalf of the oldest old patients (Suzman, Manton and Willis, 1992, p. 6). According to a German study, 1.7, 3.2, 6.2, 10.7 and 26.3 per cent of the elderly aged 65-69, 70-74, 75-79, 80-84 and 85+, respectively, regularly need health-care services (Schneekloth and others, 1996). It is the oldest old who are most likely to need help. However, in China and in almost all other developing countries, very little is known about the oldest old, and almost all published statistics, based on census data, are truncated at age 65 or so. The Population Division of the United Nations Secretariat has taken a groundbreaking step forward by revising the United Nations population estimates and projections to extend the open-ended age interval from 80+ to 100+ (United Nations, 1999b). In the present paper, we examine the projected oldest old population in China in the

twenty-first century based on our study and compare it to the most recent projections by the United Nations Population Division.

Table 2 provides the projected numbers and percentage distributions by various age groups for the elderly population in China. There were about 8 million oldest old (aged 80 and over) in 1990. As compared with the increase of all elderly persons aged 65 and above, the number of the oldest old will climb much faster, to about 13 million, 32 million, 76 million and 114 million in 2000, 2020, 2040 and 2050, respectively, under the medium mortality assumption. The average annual increase rate of the oldest old between 1990 and 2050 will be 4.2 per cent. The percentage of the oldest old among the elderly population will be nearly tripled from 1990 to 2050. From 1990 to 2040, the share increases by approximately 2.5 percentage points per 10 years. But in the 10 years from 2040 to 2050, the share increases by 10.6 percentage points. The main reason for the number of oldest old to climb so quickly after 2040 is that the population born during China's baby booms in the 1950s and the 1960s will fall into the category of oldest old at that time.

(TABLE 2 HERE)

As shown in table 2, the numbers of elderly persons aged 65+ projected by Zeng and Vaupel (1989) are fairly close to those projected by the United Nations Population Division (1999b). However, the United Nations projected number of oldest old in 2050 (99.6 million) is considerably smaller than that projected by Zeng and Vaupel (114.4 million), and the projected age distributions of the elderly population differ (see table 2). This discrepancy is mainly attributable to the different approaches for interpolating age-specific death rates in future years. We believe that our projected larger numbers and higher proportion of the oldest old may be closer to the reality of the future trend, although subject to a lot of uncertainties (see the annex below for an explanation). Despite the discrepancy and uncertainties in accurately forecasting the oldest old population, it is certain that the oldest old will increase tremendously in the twenty-first century in China (see, also, Mayer, Torrey and Kinsella, 1992, pp. 81-82). The middle of the twenty-first century will be a difficult time for China owing to the serious problems of population ageing.

Extraordinarily rapid population ageing under the low mortality scenario

The extremely rapid population ageing discussed above is based on the medium mortality variant assumed by the United Nations Population Division (1999a) and by us. The underlying assumption of the medium mortality variant is that there will be slow progress in reducing mortality in China during the twenty-first century—from a life expectancy of 68.4 years for both sexes combined in 1990 to 78.8 years in 2050. This is quite conservative, given the fact that life expectancy in Japan in 1995 was already 80 years. Some recent research indicates that there may be a significant improvement in mortality in the twenty-first century, because

of biomedical advances and breakthroughs and better personal health practices, such as healthy diets, not smoking and exercise. We therefore have made another optimistic scenario, namely, life expectancy for both sexes combined is assumed to approach 84.9 years by 2050 (Ogawa, 1988), a level that is about 4.5 years higher than in Japan today. This low mortality scenario is subject to uncertainty, but we believe that it is not impossible. For example, male and female life expectancies in Japan in 1950 were 7.7 and 10 years lower than in the United States, respectively, but the difference disappeared in the 1960s (Ogawa, 1988, p. 32). Rapid socio-economic development in China, plus the East Asian style of healthy diets and habits, may narrow the gap between Chinese and Japanese mortality levels in the twenty-first century. Some scholars believed that a life expectancy of 85 years represented the limit of human life expectancy (e.g., Fries, Green and Levine, 1989; Olshansky, Carnes and Cassel, 1990). However, most scholars now believe that human beings can, on average, live much longer than 85 years (e.g., Manton, Stallard and Tolley, 1991; Vaupel and Gowan, 1986; Guralnik, Yanagishita and Schneider, 1988). Despite uncertainty, the medium and low mortality scenarios contain an informative range of possibilities in China during the first half of the twenty-first century.

Under the low mortality scenario, the elderly will comprise 17.4 and 26.5 per cent of the total Chinese population in 2030 and 2050, respectively. The annual increase rate of the proportion of the elderly population aged 65+ between 1990 and 2050 is 2.6 per cent. By 2020, 2030, 2040 and 2050, there will be 187 million, 264 million, 370 million and 407 million elderly people, respectively, in China. Under the low mortality scenario, the oldest old will number 38 million, 58 million, 100 million and 161 million in 2020, 2030, 2040 and 2050, respectively (Zeng and Vaupel, 1989; Zeng, 1994).[4] If biomedical breakthroughs and improved health practices make the low mortality scenario a reality, population ageing problems in China will be much more serious in the twenty-first century.

More serious ageing problems in rural areas than in urban areas[5]

Although fertility in rural areas of China is much higher than in urban areas, ageing problems will be more serious in rural areas because of the continuing massive rural-to-urban migration, the large majority of which are young people. Under the medium fertility and medium mortality assumptions, the proportion of the elderly will be 26 and 22 per cent in rural and urban areas, respectively, by the middle of the twenty-first century. The proportions will be 31 per cent in rural areas in contrast to 26 per cent in urban areas under the medium fertility and low mortality assumptions (Zeng and Vaupel, 1989).

While the percentage of the elderly in rural areas in the twenty-first century will be substantially higher than in urban areas, the rural elderly are much less able to obtain the necessary social support and services. According to a survey of the elderly carried out in 1992 in 12 provinces (Beijing, Tianjing, Shanghai,

Zhejiang, Jiangsu, Heilongjiang, Shanxi, Shananxi, Shichun, Guangxi, Guizhou and Hubei), only 5.9 per cent of the rural elderly aged 60 and over were pension recipients, in contrast to 73.7 per cent in the urban areas. Some 66.6 per cent of the urban elderly had their medical expenses paid entirely or in part by the Government or collective enterprises in 1991. However, this figure was only 9.5 per cent for the rural elderly. In another survey, carried out in 1987, a relatively small proportion (32.5 per cent) of the elderly in urban areas reported that they had difficulties in obtaining medical care, while a large majority (94.8 per cent) of the rural elderly had such difficulties. About 21.3 per cent of the urban elderly reported that their nutrition status was poor; for the rural elderly, the percentage was as high as 53.3 (Population Reasearch Institute of China Academy of Social Sciences, 1988).

It is also important to note that the extremely rapid and large-scale population ageing in China is accompanied by a per capita gross national product that is considerably lower than that of many other developing countries, especially in rural areas. Thus, resources for addressing the serious problems caused by rapid population ageing are very limited.

LIVING ARRANGEMENTS OF ELDERLY PERSONS

It is clear that Chinese population ageing will be extremely rapid and the size of the elderly population will be exceptionally large in the first half of the twenty-first century. Population ageing is accompanied by changes in family household structure (see, e.g., Wolf, 1994, for a review). Elderly persons depend on spouses and children for emotional and physical support, as well as financial aid, especially in rural areas. Past research has shown that family care is an important part of long-term care, and has substantial impact on caregiving arrangements for the elderly (e.g., Soldo, Wolf and Agree, 1990). In particular, the use of institutional long-term care has been shown to vary by family status (Freedman, 1996). Cohorts who will become the elderly in the twenty-first century have been on the leading edge of family changes, with rapid decreases in fertility and quick rises in divorce (Zeng and Wu, forthcoming), and changes in attitudes about co-residence between parents and married children (Zeng , Li and Liang, 1992). Long-term-care costs in the United States have doubled during each decade since 1970, reaching an annual level of $106.5 billion in 1995. Home health-care costs grew 90.7 per cent from 1990 to 1995, in contrast to 33.4 per cent for institutional care costs (Stallard, 1999). Thus, the combination of home-based and institutional care has been rapidly shifting towards home health care, especially for the oldest old (Cutler and Meara, 1999). Clearly, changes in family structure strongly affect caregiving needs, the long-term health-care service system, and health-related policy-making (Doty, 1986; Himes, 1992).

How may demographic and socio-economic changes alter family households and the living arrangements of the Chinese elderly population? How many elderly persons live alone, or with a spouse only, or with

children or grandchildren or other relatives, or in an institution? How many elderly live with a son or a daughter and his or her spouse? What are the gender and rural-urban differences? What are the changes in living arrangements in the recent past? What are the implications of those changes on future trends? Based mainly on the data from the one-per-thousand microdata files of the 1990 and 1982 censuses, the present section addresses questions such as these, which are important for elderly caregiving and health-related policy-making.

Living arrangements of elderly persons in 1990

Table 3 and figure II present detailed and simplified percentage distributions of the living arrangements of elderly persons in mainland China, comparing rural and urban areas, based on the 1990 census data. We classify the elderly into three age groups: modest old (persons aged 65-79), very old (persons aged 80-89), and extremely old (persons aged 90+). The broader age category oldest old is a combination of the very old (aged 80-89) and the extremely old (aged 90+). We will employ this terminology in the following discussion.

(TABLE 3 HERE)

(FIGURE II HERE)

Co-residence with children

A large majority of the modest old women (73.9 per cent) and men (68.7per cent) live with their children (hereafter, children include grandchildren, unless otherwise specified). A higher proportion (79.9 per cent of females and 69.1 per cent of males) of the very old live with their children. The corresponding figures for the extremely old are the highest, 82.4 per cent for women and 76.7 per cent for men (see table 3). It is clear that a large majority of the Chinese elderly live with their children, and the higher the age, the higher the proportion living with their children. Female elderly persons of all age groups are more likely to live with their children, because elderly women are more likely to be economically dependent and widowed.

In the Chinese censuses, householders' children and children's spouse were coded as one category, "children", so that it is impossible to distinguish between married sons and married daughters who live with their parents. Thus, we have to rely on other data sources to examine the living arrangements with sons versus daughters. According to the 1998 health and longevity survey, which sampled elders aged 80+ in 22 provinces,[6] the percentage living with a daughter (among those living with children) was 17.3, 17.7 and 17.7 for men aged 80-89, 90-99 and 100+, respectively. The corresponding figures for women aged 80-89, 90-99

and 100+ are 15.4, 18.8 and 18.1, respectively. These figures show that, on the one hand, most of the oldest old live with adult sons and, on the other hand, a considerable portion of them live with adult daughters.

Based on 1990 census data, among the modest old who live with offspring, a majority (66.8 per cent of men and 79.6 per cent of women) live with both children and grandchildren. A larger majority (82.6 per cent of men and 83.2 per cent of women) of the very old who live with offspring live with both children and grandchildren. The corresponding figures for the extremely old men and women are 79.5 per cent and 77.1 per cent, respectively (see table 3). In the cultural context of Chinese society, multigeneration family households are one of the main living arrangements for the elderly, especially for the oldest old.

Slightly more than 2 per cent of the modest old men and women live with grandchildren without a son or a daughter present. The corresponding figures are 2.1 and 1.5 per cent for very old men and women, and 2.7 and 1.3 per cent for extremely old men and women (see table 3). This kind of two-generation household, consisting of grandparents and grandchildren, indicates that, in Chinese society grandchildren may care for their grandparents when the middle generation is not available (perhaps owing to job location or death); another scenario is that not very old grandparents may take care of young grandchildren.

Living with a spouse

Among the modest old men and women living with children, 36.8 and 69.7 per cent do not have a spouse present. Among the very old who live with children, a large majority (69.5 per cent of men and 94.6 per cent of women) do not live with a spouse. The corresponding figures are 80.7 and 98.9 per cent for the extremely old men and women. The proportion of elderly men who live with a spouse only is 21.6, 16.0 and 8.0 per cent at ages 65-69, 80-89 and 90+, respectively, in contrast to 15.2, 4.0 and 0.5 per cent for their female counterparts (see table 3). The proportion of the elderly not living with a spouse increases tremendously with age, owing to high rates of widowhood at old ages (divorce rate in China is extremely low). Many more elderly women are widowed than are men because of the gender differential in mortality at advanced ages.

Living alone or with other relatives or non-relatives

The proportion of the modest old men and women living alone is 8.0 and 10.2 per cent, in contrast to 13.2 and 15.2 for the oldest old men and women, respectively (the difference in the proportion living alone between ages 80-89 and 90+ is very small) (see table 3). It should be noted that elderly women are much more likely to be widowed and thus live alone. On the other hand, elderly women are economically more dependent. Therefore, the disadvantages of women in marital life and living arrangements are substantially more serious than are those of men at advanced ages.

A small proportion (0.6 and 0.3 per cent of the modest old men and women; 0.4 and 0.2 percent of the oldest old men and women, respectively) of the Chinese elderly lives with other relatives or non-relatives, without children present (see table 3). This fact demonstrates that Chinese elderly rarely live with people other than offspring and spouse.

Living in institutional households

The proportions of the modest old, very old and extremely old men living in institutional households in 1990 were 1.1, 1.2 and 1.9 per cent, respectively.[7] The corresponding figures for the modest old, very old and extremely old women were 0.3, 0.7 and 1.1 per cent, respectively (see table 3). Given the extremely limited facilities available for institutional care for the elderly, perhaps the major cause of institutionalization of elderly persons in China in 1990 was childlessness (or absence of children). Therefore, the percentage of institutionalized elderly persons was extremely low as compared to that in developed countries, where the most important reason for an elderly person being placed in an institution was disability. It should be noted that the lower social and economic status of elderly Chinese women made them less likely to be able to access long-term-care facilities. This is another social disadvantage faced by elderly women in Chinese society, which merits attention by the Government and society.

Rural-urban differentials in 1990

Table 3 and figure II present detailed and simplified percentage distributions of the living arrangements of elderly persons in 1990, with a comparison between rural and urban areas. The proportion of the modest old men who live with children in rural and urban areas in 1990 was 69.7 and 65.9, respectively, and the corresponding figures for women were 74.7 and 71.8 (see table 3). Thus, rural modest old persons are more likely to live with their children than are their urban counterparts. However, the proportion of the very old and extremely old persons who live with their children in the rural areas is slightly lower than that in the urban areas, except for men aged 80-89. More studies are needed to explain this phenomenon.

An interesting finding is that many more urban oldest old persons live with daughters than do their rural counterparts. Among the oldest old men and women aged 80+ who live with children in urban areas, 26.6 and 28.8 per cent live with a daughter, while the corresponding figures are 11.8 and 9.5 per cent in the rural areas, based on data from the 1998 health and longevity survey. Such striking rural-urban differentials of proportions living with daughters among the oldest old also exist at age groups 80-89, 90-99 and 100+. This shows the traditional idea of relying on sons for old-age care is less popular in urban areas, and is changing with modernization. Old people in urban areas accept, or even prefer, to live with a daughter, if possible, since daughters are more likely to provide better care to old parents than are sons. This gives us hope that the

traditional son preference in China may be reversed if urbanization is accompanied by appropriate social programmes that aim at increasing women's status and encouraging old persons to live with their daughters.

The proportion of those modest old, very old and extremely old men and women who live with both children and grandchildren is higher in rural than in urban areas (see table 3). This confirms the fact that the multigeneration family household is more popular in rural areas than in urban areas in contemporary China.

The proportion of the modest old, very old and extremely old who live with grandchildren, without a son or a daughter present, is about two to five times higher in urban areas than in rural areas (see table 3). This suggests that job location (rather than death) of the middle generation is the main reason for these special two-generation households, consisting of grandparents and grandchildren.

Slightly more of the modest old men and women in urban areas than in rural areas live with a spouse only. However, among the very old and extremely old, there is no clear pattern of rural-urban differences in living with a spouse only (see figure II and table 3).

There is no clear pattern of rural-urban differences in the proportion of the modest old who live alone, but it is evident that the proportion of the very old and extremely old who live alone is higher in rural areas than in urban areas (see figure II and table 3). People generally speculate that the urban elderly are more likely to prefer privacy and independent living arrangements, and thus are more likely to live alone than are their rural counterparts. But Chinese census data do not support this hypothesis. Perhaps, other factors such as higher widowhood rates, lower remarriage rates and fewer long-term-care facilities in rural areas than in urban areas offset the effects of rural-urban attitude differences. One may also speculate that the preference for privacy and independent living arrangements, even among Chinese elderly in urban areas, is still not strong. More in-depth studies are needed.

The proportions of institutionalized modest old, very old and extremely old men and women were two to four times higher among the urban population than for rural residents in 1990 (see figure II and table 3). This is not surprising since very few institutional facilities for the elderly are available in rural areas. The rural oldest old living in institutional households are there because of childlessness rather than disability. Chinese policies in rural areas allow only those elderly who have no close relatives to stay in government-subsidized institutional households. In urban areas, facility limitation and institutional policies are relatively less restrictive, permitting more elderly to live in institutional households.

Table 4 and figure III contain detailed and simplified percentage distributions of the living arrangements of elderly persons (rural and urban areas combined),[8] with a comparison between 1990 and 1982, based on the census data collected in those two years. The proportion of the elderly living with children decreased slightly, from 69.6 per cent in 1982 to 68.7 per cent in 1990, for the modest old men and remained virtually unchanged for the modest old women (74.1 per cent in 1982 and 73.9 per cent in 1990). The proportions of the very old and extremely old men and women who live with children increased by two to four percentage points between 1982 and 1990 (see table 4). The proportion of elderly men and women aged 65-79, 80-89 and 90+ who live with both children and grandchildren also increased between 1982 and 1990 (see table 4). Furthermore, the proportion living alone declined considerably at all ages (see figure III and table 4). Were the living arrangements of Chinese elderly in 1990 more traditional than in 1982? This seems unlikely, given the rapid socio-economic development and opening door to the outside world that occurred in China during the 1980s. How, then, can we interpret this phenomenon, which is contradictory to general and theoretical expectations? We believe that the following factors may have contributed to this situation. First, the elimination of the previous food rationing system and changes in the function of household register booklets around 1990 may have played a role. In the 1970s and early 1980s, low efficiency in the collective agriculture production system resulted in severe food shortages. In addition to the main food rationing, other foodstuffs such as meat, fish, and eggs were primarily supplied on the basis of the household register booklet. Each household could periodically purchase certain amounts of low-priced subsidiary foods, and the household register booklet was used as identification. This led some young and old people, who actually lived with family members, to register as a separate household. The number of one-person households, including elderly persons living alone, was overenumerated and the number of the elderly living with children was underenumerated. Such biases resulted in the State Statistical Bureau adjusting the urban average family household size enumerated in the 1982 census from 3.84 to 3.95 through a post-census sample check. The rural household size was not adjusted, but a similar bias (possibly smaller) existed in the rural areas in the 1982 census. Such biases were much less serious in 1990 because the food rationing system was basically eliminated and the incentive for having more household register booklets was greatly reduced. Secondly, increases in remarriage rates and decreases in death rates at old ages may also partly explain why the proportion of the elderly who lived alone declined between 1982 and 1990. The increase in remarriage rates among elderly persons was a result of the social reform and the success of match-making services in the late 1980s. The reform aimed at protecting elders' rights, including the right to remarry, which were often violated by the intervention of children and other family members in traditional Chinese society. Rapid economic development, accompanied by substantial improvements in the standard of living, may have decreased the death rate at old ages. Although these explanations are speculative owing to the lack of empirical data, we believe that the living arrangements

of the Chinese elderly in the 1980s were not a return to tradition. We also believe that the custom of Chinese elderly living with their children has changed little, if at all, between 1982 and 1990.

(TABLE 4 HERE)

(FIGURE III HERE)

The proportion of the elderly living with spouses (including with spouse only and with spouse and children) increased considerably between 1982 and 1990 among the modest old and very old men and women, but remained almost unchanged among women aged 90+ and decreased by three percentage points among men aged 90+ (see table 4). Similar changes in the proportion of the elderly living with spouse only between 1982 and 1990 among the modest old, very old and extremely old persons were also observed (see figure III and table 4). We believe that possible explanatory factors for this interesting phenomenon are increases in remarriage rates among the elderly aged 65-89 and decreased death rates in the 1980s, as discussed above. Another possible explanation is a decrease in divorce rates among the modest old persons. However, this factor can be ruled out, since divorce rates among elderly persons are extremely low in China, and there is no evidence of a further decline. In fact, the general divorce rates for the entire population have substantially increased in China since 1980 (Zeng and Wu, forthcoming).

As compared to 1982, the proportion of the elderly living in institutional households increased in 1990 among women aged 80-89 and men and women aged 90+, remained unchanged among men aged 80-89 and women aged 65-79, and decreased among men aged 65-79 (see figure III and table 4). Socio-economic development in the 1980s may have contributed to an improvement in long-term-care facilities, which facilitated the increase in the proportion of those living in institutional households, although it is still very low. Commercial nursing home facilities for the elderly have been growing at a fast pace since 1990 owing to rapid economic development. Based on the data from the 1998 survey conducted in 22 provinces, the percentage of the institutionalized oldest old is 6.1 for men and 6.7 for women aged 80+. These figures are still low when compared with Western countries but have increased tremendously since1990. Modernization in China may further increase the proportion of the elderly living in long-term-care institutions in the future.

DISCUSSION AND POLICY CONSIDERATIONS

A combination of rapid fertility decline since 1970, continued decrease in mortality and the large baby-boom cohorts born in the 1950s, 1960s and early 1970s is the demographic basis for the extremely rapid ageing of the population in China. Total fertility rates have declined tremendously, from about 6 children per woman before 1970 to about 2.6 children by the end of the 1970s, more than a 50 per cent reduction in a

decade. Chinese fertility has continued to fall steadily (with some fluctuation around 1987) to slightly below replacement level at the present time. While the lower fertility rate since 1970 has resulted in smaller cohorts of young persons, the large number of cohorts born during the first and second baby booms in the 1950s, 1960s and early 1970s will become elderly in the first half of the twenty-first century. There were 172 million persons aged 35-44 (born in 1950-1959) in 1995, and they will be aged 65+ after 2015-2024. There were 355 million persons aged 20-34 (born in 1960-1974) in 1995, and they will be aged 65+ after 2025-2039. Continued mortality decline will enable more members of those huge baby boom cohorts to survive to old ages. As indicated by Grigsby and Olshansky (1989, p. 328), at least 50 per cent of the projected increase in population ageing between 1980 and 2050 in China is a product of the momentum for ageing that is already built into the present age structure and vital rates.

The trend of Chinese population ageing is not avoidable, and further declines in mortality and fertility will accelerate this trend. What can we do to respond to such extremely rapid ageing of the population in China? In the present paper it has been suggested that strengthening family support for the elderly is one policy strategy that needs to be investigated and adopted. As discussed above, a large majority of Chinese elderly, especially the oldest old, live with their children, including grandchildren. The strong cultural preference of the Chinese elderly for living with children has lasted for thousands of years. The benefits of co-residence with children for the majority of the Chinese elderly are not only financial and material support, but also psychological satisfaction (Lin, 1995, p. 141). The Government of China needs to consider a series of policies that aim at strengthening family support for the elderly. For example, adequate tax exemption and favourable housing policies may be awarded to persons living with old parents. To encourage family support for the elderly and to satisfy the increasing needs for privacy and independence in daily life, the so-called parent-child proximity apartment units need to be promoted through governmental subsidies. The basic idea is to have two kitchens, two living rooms and at least two bathrooms in one apartment unit. The unit is structured so that old parents and one of their adult children and his or her family live in the same housing unit, with both generations also enjoying their own privacy and independence. The elderly can easily receive assistance from their children and they can conveniently provide help in caring for grandchildren, while at the same time, generation differences with respect to preferences regarding eating, watching television and time schedules of daily activities can be preserved.

Population ageing in China will lead to a heavy burden of support of a mass of elderly people, and ageing problems will be more serious in rural areas than in urban areas. Responding to the problems of population ageing in rural areas is an urgent issue on China's agenda for the twenty-first century. Given the strong cultural preference of the Chinese elderly for living with children and the possibility of maintaining or even strengthening family support in China, should the Government give all or a major part of the responsibility for old-age care to families? Because there are very few social insurance programmes in the rural areas and limits

on government resources, some people, including some policy makers propose an official statement that old-age support in rural areas should rely mainly on the family. We think that this policy is inappropriate for several reasons. First, mainly relying on the family for old-age support in rural areas may not be feasible in the twenty-first century, because ageing problems will be more serious in rural areas than in urban areas. The future rural elderly will have, on average two children, and many of the children may migrate to urban areas (in contrast to the rural elderly of the past and present who had about six children staying in rural areas). The joint survival of parents and children will increase substantially in the future, so that the burden of caring for old parents, per child, will be much larger than at present (Tu, Liang and Li, 1989). Secondly, relying mainly on family support without social security would largely limit the independence of the elderly in decision-making concerning their own lives. Family support plus social security would place the elderly in a much better position for happiness. Thirdly, couples in many less developed rural areas still bear three or more children. A popular idea and practical need for having more children, especially sons, is expressed in the old Chinese saying "having sons for old-age care" (*yang er fang lao*). When fertility is greatly reduced, the practical need for "having sons for old-age care" has led people to try to determine the sex of the child prenatally, by ultrasound and other techniques, and to have sex-selective abortions (Zeng and others, 1993). The reported sex ratio at birth reached 117.0 boys per 100 girls in 1997 (China, State Statistical Bureau, 1998), in contrast to the normal value of about 106. If the Government officially states that old-age supports rely mainly on the family in rural areas, peasants may ask "if we do not have more children, and at least one son, how can the elderly be supported?" Such a policy will not be good for family planning and reversing the dangerous trend of a rising sex ratio at birth. The establishment of an old-age insurance system in rural areas is therefore an extremely important response to population ageing, family planning and reversing the sex ratio at birth in China. However, is it practical and how can peasants who have just been lifted out of poverty be mobilized to pay the premium for old age-insurance? Is it feasible and how can an old-age insurance programme be implemented in the less developed rural areas? With such questions in mind, the first author went to Shandong and Shichuan Provinces, which are the experimental areas for the old-age insurance programme in rural areas, to conduct field studies in 1993 and 1996. The evidence gathered in this and other studies shows a promising trend towards establishing old-age insurance programmes in rural areas. However, the momentum has just started and it is facing and will continue to face many problems and difficulties. The Government of China and all levels of society should pay more attention and make greater efforts in this area (Zeng, 1995).

The old pension system in China, which was implemented in state-owned enterprises in urban areas, was established in the 1950s and was based on the former Soviet Union's model at that time. Many Chinese reformers have recognized the urgent need for reforming the old pension system in urban areas. Moreover, the new system should also cover citizens who are not working in state-owned enterprises. Chinese policy makers should continue to act effectively to establish and reform old-age insurance systems in both rural and urban

areas. This may be regarded as building a new Great Wall to prevent the possible crises that may be caused by extremely rapid population ageing in China in the twenty-first century.

In addition to an old-age insurance programme, which is critical to respond to the ageing challenges and to reduce son preference, another important policy recommendation is to encourage the elderly to live with their daughters. The present study has shown that this policy option is highly feasible, given the fact that nearly 30 per cent of the elderly in urban areas lived with their daughters in 1990, and the figure was nearly 18 per cent for rural and urban areas combined. If the Government provides economic incentives and the public media give more publicity to families with old parents and daughters living together, the traditional preference for sons may gradually become weaker. Since daughters and their spouses are usually more willing and able to provide better physical and psychological care to their old parents, a policy for promoting living with daughters may be beneficial for the elderly as well.

Data analyses presented in this paper have shown that elderly women are much more likely to be widowed and more likely to live alone. Elderly women are economically more dependent and less likely to use long-term-care facilities. The disadvantages that older women face in marital status and living arrangements are substantially more serious at advanced ages and in rural areas. This is another important issue that needs serious attention from society and the Government. Any type of long-term-care services sponsored by the Government should take into account the disadvantaged status of elderly women and provide them with favourable policies. Careful attention should be given to ensure that any old-age insurance programmes being developed or reformed benefit older women and men equally.

Numerous studies have shown that the elderly are not only consumers and care receivers, but are also producers and care providers, especially when they are still healthy. Based on a survey carried out in the Wuhan area of China (Liang, Gu and Krause, 1992, p. 58), it was found that elderly persons usually provide a substantial amount of help to others while they receive care, and they are satisfied with such interpersonal supportive ties. In addition to helping their children with housework and caring for grandchildren, the younger and healthier elderly can provide supplementary assistance in caring for the older and more frail elderly, either within or outside their own families. For example, the success of care services organized by the neighbourhood committee in Shanghai illustrates the value of fostering community programmes that mobilize the younger and healthier elderly to provide accessible services for the dependent elderly (Lin, 1995, p. 145). It was estimated that one fourth to one third of China's elderly continue to be employed in paid or volunteer work. Many retired professionals, for example, provide technical consulting services to small firms located in towns or villages (Nusberg, 1987, p. 19). Properly mobilizing and organizing the elderly to participate in community services and interpersonal exchange programmes will also improve the elderly person's spiritual

well-being, in particular to continue to feel needed and productive. This is one of the important policy actions that should be considered in order to resolve the serious ageing problems in the twenty-first century.

Facing extremely rapid population ageing, we believe that China needs to embark on a smooth transition to a "two-child plus spacing" policy. This policy would promote later marriage, later first birth and appropriate spacing (four to five years) between the first and second child. Couples who voluntarily choose to have only one child should be rewarded. As shown in some limited experimental areas discussed elsewhere (Zeng, 1997), the two-child plus spacing policy can help reduce the still high fertility rate in many rural areas, because it better meets the practical needs of peasants and is thus more acceptable to rural couples. Couples who follows the current one-child policy in urban areas and the 1.5-child policy (e.g., if the first child is a girl, the couple is allowed to have a second child) in rural areas will have much less family support when they become old, as compared to those who have more children by ignoring the policy. This is unfair, but difficult to change because the one-child and the 1.5-child policy do not meet peasants' practical needs. The universal two-child plus spacing policy will better realize the principles of equality among citizens. Later birth and longer spacing will enable future elderly persons to enjoy a longer period of support from their young and middle-aged children, as compared to the usual practice of early childbearing under the current policy. The current 1.5-child policy in the rural areas implicitly gives more value to a boy child. The two-child plus spacing policy can help eliminate such a bias and equalize the familial position of sons and daughters, thus reversing the increasing sex ratio at birth. There are many reasons to believe that the two-child plus spacing policy is better for China in the twenty-first century, especially in dealing with extremely rapid ageing. However, we also realize that any sudden relaxation in the population policy without appropriate operational preparations in such a large country, which has many poor and backward rural areas, may cause a new baby boom. China need carefully designed scientific research to convince policy makers to move towards the two-child plus spacing policy. China also needs solid operational studies, including establishing more experimental areas in different parts of the country, to ensure a successful transition of policy.

ANNEX

Note on the discrepancy in the projected number of oldest old persons aged 80+

As discussed in the text, the United Nations projected number of oldest old persons (aged 80+) in 2050 (99.6 million) is considerably smaller than our projection (114.4 million), and the projected age distributions among the elderly population differ notably (see table 2). This discrepancy is partly attributable to differences in model specification and slightly different assumptions about future life expectancy. We classified the population into rural and urban sectors; the United Nations did not. The starting years of our projections and those of the United Nations differ. The United Nations used a constant –0.1 per thousand net international

migration rate; we did not. In our current research for preparing this paper, we performed a new exercise in which we combine rural and urban sectors, start our projection from 1995 and use the same life expectancy assumption and constant net international migration rate as the one used by the United Nations. In this new exercise, the only difference is the method for interpolating age-specific death rates. The United Nations Population Division used model life tables to interpolate the five-year age-specific death rates in future years. We followed an iterative procedure to alter the death rates proportionally at the same rate at all ages of single-year specifics, and the iterative procedure stops when the projected life expectancy at birth in the particular year is achieved (Wade, 1989; Ahlburg and Vaupel, 1990). The discrepancy between the results of our new exercise and the United Nations projection becomes even larger: our new exercise projected 125 million oldest old persons in 2050, in contrast to the 99.6 million projected by the United Nations. We therefore concluded that the discrepancy is mainly attributable to the different approaches in interpolating age-specific death rates in future years. The United Nations model life-table approach assumes that the age pattern of changes in death rates in the future is the same as what was observed in the past, namely, death rates decline faster at younger ages than at older ages. This approach has led to implausible values (almost zero) of projected death rates at some young ages when mortality level is very low (Buettner,1999, p. 8; United Nations, 1998, pp. 7-8; Lee and Carter, 1992, p. 666). The approach we employed assumes that changes in death rates at each age are proportional to the age-specific death rates, which implies a faster decline of mortality at advanced ages than at young ages when mortality level is low, and does not produce too low death rates at young ages. We compare the projected life tables with the same assumptions of life expectancies at birth but following the United Nations model life-table approach and our approach of proportionally reducing death rates, respectively. The shapes of the curves of the two sets of life-table survival probabilities look plausible, but the United Nations model life-table survival probabilities are slightly higher before age 75 and significantly lower after age 80.

Since the early 1970s, female death rates in Japan have declined at annual rates of about 3 per cent for the elderly aged 80-89 and 2 per cent for those aged 90-99 (Vaupel and others, 1998, p. 856), which is substantially higher than the rate of decline at younger ages. Rates of progress in reducing mortality rates among the elderly aged 60 and above in Sweden have accelerated over the course of the century, and from the 1960s to the 1980s ran at an average rate of 1 to 2 per cent for females and half a per cent for males (Vaupel and Lundstrom, 1994, p. 303, table 12.1). In most developed countries, the rate of reduction of death rates at older ages has been accelerated, especially since 1970 (Kannisto and others, 1994; Vaupel and others, 1998, p. 855). If the recent trend of an accelerated reduction in mortality rates at advanced ages observed in several European countries persists in the future, our projected larger numbers and higher proportion of oldest old persons may be closer to reality. We also realize that proportionally reducing death rates at all ages is not ideal

either, and further research on how to forecast age-specific rates of changes in mortality is imperative. Such research will be very useful to improve the accuracy of population projection, which may have major implications in ageing studies and socio-economic policy-making.

[1]The medium fertility variant assumes that the rural total fertility rate (TFR) would gradually decrease from 2.65 observed in the late 1980s to 2.23 in 2000, and reach the replacement level of 2.15 by the middle of the twenty-first century. The urban sector would have a total fertility rate of 1.64 in 2000 and 1.70 in 2050 (Zeng and Vaupel, 1989). These assumptions were made by us 10 years ago and seem quite plausible based on current information. The latest official figure of Chinese TFR in 1998 is 1.84 (*People's Daily*, 12 October 1999). But we believe that it is a substantial underestimation. Our estimates are that current TFR in rural areas is about 2.2, and urban TFR is about 1.6 (see Zeng, 1996, for a detailed discussion). We estimate that the weighted average of TFR for all of China is about 2.0 at the present time (with an estimated 60 per cent and 40 per cent rural and urban population, respectively). As stated above, we assume that TFR in rural and urban areas of China in 2050 would be 2.15 and 1.7, respectively. The weighted average for the entire country would be 1.8 in 2050 (with assumed weights of 20 per cent and 80 per cent of rural and urban sectors, respectively).

[2]These projected figures are all under the medium fertility variant, which assumes that rural fertility will gradually reach the level of replacement by the middle of the twenty-first century, and the urban sector will have a total fertility rate of 1.7 in 2000 and remain constant thereafter.

Life expectancies at birth under the medium and low mortality assumptions are listed as follows:

Year		Medium mortality			Low mortality		
		Male	Female	Both sexes	Male	Female	Both sexes
2000	Rural	69.0	72.0	70.5	71.0	74.0	72.5
	Urban	72.0	76.0	74.0	74.0	78.0	76.0
	Total	70.5	74.0	72.3	72.5	76.0	74.3
2050	Rural	75.0	77.5	76.3	79.4	85.6	82.5
	Urban	78.0	81.0	79.5	81.9	89.1	85.5
	Total	77.4	80.3	78.8	81.4	88.4	84.9

[3]Given the evidence that urbanization is under way and the likelihood that substantial rural-urban fertility differences will persist, the model developed by Zeng and Vaupel (1989) incorporates the disaggregation of the population according to the rural-urban dichotomy and a net migration flow from rural to urban areas by single year of age. The dynamics of the model are based on the calculation procedures of multiregional population projection (Rogers, 1975; Rogers and Willekens, 1986; Schoeni, 1988; Land and Rogers, 1982). The United Nations 1998 revision follows a classical approach of population projection with five-year age classifications, without consideration to rural-urban differentials and dynamics (United Nations, 1999a, 1999b).

[4]The United Nations 1998 projections do not include the low mortality variant for China and any other countries, so that no comparisons are available under the low mortality assumption between our projections and those of the United Nations for China and between China and other countries.

[5]The United Nations Population Division did not classify population projections by rural and urban sectors. We, were therefore unable to make a comparison with the United Nations projection for the rural-urban differentials of population ageing.

[6]The 1998 health and longevity survey was carried out in 22 provinces: Liaoning, Jilin, Heilongjiang, Hebei, Beijing, Tianjing, Shanxi, Shananxi, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shangdong, Henan, Hubei, Hunan, Guangdong, Guangxi, Sichuan and Chongqing, covering 985 million people, 85.3 per cent of the total population of China. The survey interviewed 9,073 oldest old individuals aged 80 and above (see Zeng and others, forthcoming, for a more detailed description of the survey and data-quality evaluation).

[7]The Chinese censuses define nursing homes or other type of long-term care institutions for the elderly, as well as other households consisting of young or middle-aged persons who have no familial relationships, as *ji ti hu*. *Ji ti hu* can be literally translated into English as "collective households" or, based on its substantive meaning for the elderly, as "institutional households". We use the term "institutional households" in this paper.

[8]It is almost impossible to compare the rural and urban differentials between 1990 and 1982 owing to large changes in the rural-urban administrative boundaries in 1990, which included substantial portions of rural people into the urban boundary and did not reflect the truth of urbanization (Ma, 1988).

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TABLE 1. INTERNATIONAL COMPARISON OF INDICATORS OF POPULATION AGEING

| | Percentage of elderly aged 65+ | | | Number of elderly persons (millions) | | | |
	1990	2030	2050	Aged 65+ 1990	Aged 65+ 2050	Aged 80+ 1990	Aged 80+ 2050
China	5.6	15.7	22.6	63.0	334.0	7.839	99.602
India	4.3	9.7	15.1	37.0	230.9	4.017	46.999
Mexico	4.0	10.9	18.6	3.3	27.3	0.644	5.979
Republic of Korea	5.0	18.1	24.7	2.1	12.6	0.276	3.763
Canada	11.2	22.6	23.8	3.1	10.1	0.643	3.759
France	14.0	23.2	25.5	7.9	15.3	2.136	5.696
Germany	15.0	26.1	28.4	11.9	20.8	2.985	8.299
Italy	15.3	29.1	34.9	8.7	14.4	1.963	5.787
Japan	12.0	27.3	31.8	14.8	33.4	2.922	12.090
United Kingdom	15.7	23.1	24.9	8.1	14.1	2.092	5.287
United States of America	12.4	20.6	21.7	31.5	75.8	7.213	26.914

Source: United Nations (1999a, 1999b).

TABLE 2. AGE DISTRIBUTION AMONG ELDERLY PERSONS AGED 65+ IN CHINA

Age	Projection using the model developed by Zeng and Vaupel					Projection by United Nations Population Division			
	1990	2000	2020	2040	2050	2000	2020	2040	2050
65-74 (millions)	44.4	62.1	111.3	188.0	150.1	60.2	114.3	194.3	158.7
(per cent)	70.5	66.3	65.8	59.2	45.4	68.8	68.4	60.5	47.6
75-84 (millions)	16.3	26.4	44.0	96.5	131.6	23.6	42.3	97.8	132.6
(per cent)	25.9	28.2	26.0	30.4	39.8	27.0	25.3	30.5	39.7
85+ (millions)	2.3	5.2	13.9	33.0	48.9	3.7	10.5	29.0	42.3
(per cent)	3.7	5.5	8.2	10.4	14.8	4.2	6.3	9.0	12.7
80+ (millions)	7.7	13.1	32.2	76.1	114.4	11.5	26.6	64.3	99.6
(per cent)	12.2	14.0	19.0	24.0	34.6	13.2	15.9	20.0	29.9
75+ (millions)	18.6	31.6	57.9	129.5	180.5	27.3	52.9	126.8	174.9
(per cent)	29.5	33.7	34.2	40.8	54.6	31.2	31.6	39.5	52.4
65+ (millions)	63.0	93.7	169.2	317.5	330.6	87.5	167.2	321.1	333.6
(per cent)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Projections using the model developed by Zeng and Vaupel (1989) are from Zeng (1994, p. 77); projections by the United Nations Population Division are from United Nations (1999b).

TABLE 3. PERCENTAGE DISTRIBUTION OF LIVING ARRANGEMENTS OF THE ELDERLY IN CHINA (ALL 30 PROVINCES), 1990, COMPARING RURAL AND URBAN AREAS

		Alone	Spouse	Living with spouse and child/grandchild or others					No spouse, living with child/grandchild or others					Institution	Total number
				Child	Grandchild	Child and grandchild	Others only	Subtotal	Child	Grandchild	Child and grandchild	Others only	Subtotal		
Ages 65-79															
Males	Rural	8.3	20.8	16.6	1.2	24.9	0.2	42.9	4.2	0.4	22.4	0.2	27.2	0.8	205 269
	Urban	7.1	23.9	15.8	3.6	26.1	0.5	46.0	3.7	0.9	15.8	0.4	20.8	2.1	69 595
	Total	8.0	21.6	16.4	1.8	25.2	0.3	43.7	4.1	0.5	20.7	0.3	25.6	1.1	274 864
Females	Rural	9.9	15.1	5.4	0.8	16.2	0.1	22.6	7.8	0.6	43.9	0.1	52.3	0.2	237 923
	Urban	11.4	15.5	5.1	2.5	15.0	0.3	22.8	6.6	2.5	40.1	0.4	49.7	0.7	75 686
	Total	10.2	15.2	5.3	1.2	15.9	0.2	22.6	7.5	1.0	42.9	0.1	51.6	0.3	313 609
Ages 80-89															
Males	Rural	13.8	15.3	4.0	0.5	15.7	0.1	20.3	5.8	0.6	43.1	0.2	49.7	0.9	20 227
	Urban	11.4	18.0	4.4	2.9	16.7	0.3	24.3	6.2	2.0	35.4	0.6	44.2	2.0	6 966
	Total	13.2	16.0	4.1	1.1	16.0	0.2	21.3	5.9	1.0	41.1	0.3	48.3	1.2	27 193
Females	Rural	15.5	4.1	0.7	0.1	3.5	0.0	4.4	11.1	0.6	63.8	0.1	75.6	0.4	36 334
	Urban	14.2	3.8	0.6	0.6	3.0	0.0	4.2	11.6	3.4	61.1	0.5	76.6	1.3	12 543
	Total	15.2	4.0	0.7	0.2	3.4	0.0	4.3	11.3	1.3	63.1	0.2	75.8	0.7	48 877
Ages 90+															
Males	Rural	13.5	8.6	4.4	0.9	9.8	0.0	15.1	8.6	1.2	51.4	0.1	61.3	1.5	777
	Urban	12.3	6.7	2.5	1.7	10.1	0.0	14.3	10.4	2.5	50.7	0.3	63.9	2.8	357
	Total	13.1	8.0	3.8	1.1	9.9	0.0	14.8	9.2	1.6	51.1	0.2	62.1	1.9	1 134
Females	Rural	18.2	0.4	0.2	0.0	0.7	0.0	0.8	16.1	0.5	63.4	0.1	80.1	0.5	2 261
	Urban	10.8	0.8	0.0	0.0	0.9	0.0	0.9	20.0	3.3	61.6	0.3	85.2	2.4	1 011
	Total	15.9	0.5	0.1	0.0	0.7	0.0	0.9	17.3	1.3	62.8	0.2	81.7	1.1	3 272
Ages 80+															
Males	Rural	13.8	15.0	4.0	0.5	15.5	0.1	20.1	5.9	0.6	43.4	0.2	50.1	0.9	21 004
	Urban	11.5	17.5	4.3	2.8	16.4	0.3	23.8	6.4	2.0	36.1	0.6	45.2	2.0	7 323
	Total	13.2	15.7	4.1	1.1	15.7	0.1	21.1	6.0	1.0	41.5	0.3	48.9	1.2	28 327
Females	Rural	15.7	3.9	0.7	0.1	3.4	0.0	4.2	11.4	0.6	63.8	0.1	75.8	0.5	38 595
	Urban	13.9	3.6	0.6	0.5	2.8	0.0	3.9	12.2	3.4	61.2	0.5	77.2	1.4	13 554
	Total	15.2	3.8	0.6	0.2	3.2	0.0	4.1	11.6	1.3	63.1	0.2	76.2	0.7	52 149
Ages 65+															
Males	Rural	8.9	20.3	15.4	1.1	24.1	0.2	40.8	4.4	0.4	24.3	0.2	29.4	0.8	226 273
	Urban	7.5	23.3	14.7	3.6	25.2	0.5	43.9	4.0	1.0	17.8	0.4	23.2	2.1	76 918
	Total	8.5	21.0	15.2	1.7	24.3	0.3	41.6	4.3	0.6	22.7	0.3	27.8	1.1	303 191
Females	Rural	10.7	13.5	4.8	0.7	14.4	0.1	20.0	8.3	0.6	46.6	0.1	55.6	0.2	276 518
	Urban	11.8	13.7	4.4	2.2	13.1	0.3	20.0	7.5	2.7	43.3	0.4	53.8	0.8	89 240
	Total	10.9	13.5	4.7	1.1	14.1	0.1	20.0	8.1	1.1	45.8	0.2	55.1	0.4	365 758

TABLE 4. PERCENTAGE DISTRIBUTION OF LIVING ARRANGEMENTS OF THE ELDERLY IN CHINA (ALL 30 PROVINCES), RURAL AND URBAN AREAS COMBINED, COMPARISON BETWEEN 1990 AND 1982

		Alone	Spouse	Living with spouse and child/grandchild or others					No spouse, living with child/grandchild or others					Institution	Total number
				Child	Grandchild	Cchild and grandchild	Others only	Subtotal	Child	Grandchild	Cchild and grandchild	Others only	Subtotal		
Ages 65-79															
Males	1990	8.0	21.6	16.4	1.8	25.2	0.3	43.7	4.1	0.5	20.7	0.3	25.6	1.1	274 864
	1982	10.5	17.5	19.2	1.7	21.7	0.4	43.0	5.2	0.6	21.2	0.5	27.5	1.5	186 530
Females	1990	10.2	15.2	5.3	1.2	15.9	0.2	22.6	7.5	1.0	42.9	0.1	51.6	0.3	313 609
	1982	13.1	11.9	5.0	1.1	12.2	0.3	18.5	9.2	1.3	45.5	0.3	56.2	0.3	226 812
Ages 80-89															
Males	1990	13.2	16.0	4.1	1.1	16.0	0.2	21.3	5.9	1.0	41.1	0.3	48.3	1.2	27 193
	1982	16.5	14.2	4.7	1.4	14.1	0.4	20.4	4.7	1.2	41.2	0.5	47.6	1.2	15 584
Females	1990	15.2	4.0	0.7	0.2	3.4	0.0	4.3	11.3	1.3	63.1	0.2	75.8	0.7	48 877
	1982	18.5	3.0	0.4	0.2	2.5	0.1	3.2	8.5	1.6	64.5	0.4	75.0	0.3	29 653
Ages 90+															
Males	1990	13.1	8.0	3.8	1.1	9.9	0.0	14.8	9.2	1.6	51.1	0.2	62.1	1.9	1 134
	1982	16.5	8.7	6.3	3.3	7.1	0.5	17.1	6.9	0.8	47.8	0.6	56.1	1.5	665
Females	1990	15.9	0.5	0.1	0.0	0.7	0.0	0.9	17.3	1.3	62.8	0.2	81.7	1.1	3 272
	1982	20.2	0.7	0.1	0.1	0.6	0.0	0.8	13.0	1.9	62.6	0.2	77.7	0.5	1 767
Ages 80+															
Males	1990	13.2	15.7	4.1	1.1	15.7	0.1	21.1	6.0	1.0	41.5	0.3	48.9	1.2	28 327
	1982	16.5	14.0	4.7	1.4	13.8	0.4	20.3	4.8	1.2	41.4	0.5	48.0	1.2	16 249
Females	1990	15.2	3.8	0.6	0.2	3.2	0.0	4.1	11.6	1.3	63.1	0.2	76.2	0.7	52 149
	1982	18.6	2.9	0.4	0.2	2.4	0.0	3.1	8.8	1.6	64.3	0.3	75.1	0.3	31 420
Ages 65+															
Males	1990	8.5	21.0	15.2	1.7	24.3	0.3	41.6	4.3	0.6	22.7	0.3	27.8	1.1	303 191
	1982	10.9	17.2	18.1	1.7	21.0	0.4	41.2	5.2	0.7	22.8	0.5	29.1	1.5	202 779
Females	1990	10.9	13.5	4.7	1.1	14.1	0.1	20.0	8.1	1.1	45.8	0.2	55.1	0.4	365 758
	1982	13.8	10.8	4.4	1.0	11.0	0.3	16.7	9.2	1.3	47.8	0.3	58.5	0.3	258 232