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Chapter 16 The Challenge to Healthy Longevity: Inequality in Health Care and Mortality in China

Zhongwei Zhao

Abstract China made great progress in lowering mortality in the second half of the twentieth century. Its life expectancy increased from approximately 35 years to more than 65 years between 1950 and 1980. China's recent socio-economic reforms started in the late 1970s and has brought about both positive and negative changes in social security and health care systems. Some of the changes have created difficulties for the further improvement of public health. While China's mortality has continued to fall in the last 25 years and life expectancy has now reached 72 years, it also faces serious challenges in further improving healthy longevity. This chapter first reviews the epidemiological transition and increasing longevity in the world. It then discusses China's mortality decline and some major changes in health care taking place in recent decades. Following that, it examines the increasing inequality in health care and mortality across different areas and population groups. Finally, it comments on major challenges in raising healthy longevity and some related issues.

Keywords Accessibility of health services, Advanced areas, Age reporting, Ageing, China, Cause of death, Cooperative Medical System, Disparity, Epidemiological Transition, Gini index, Government Insurance Scheme, Health care, Health care coverage, Health care system, Health expenditure, Health services, Healthy longevity, Health workers, Income distribution, Inequality, Labour Insurance Scheme, Large cities, Less developed areas, Life expectancy, Mortality decline, Mortality differential, Mortality transition, Regional variation, Rural areas, Sanitary conditions, Standards of living

China has made significant progress in reducing mortality in the second half of the twentieth century. Between 1950 and 1980, its life expectancy at birth has increased from approximately 35 to more than 65 years. This achievement and the successful experiences of lowering mortality in Sri Lanka, Costa Rica and some

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Zeng Yi et al. (eds.), *Healthy Longevity in China*.
© Springer Science+Business Media B.V. 2008

other populations have been widely regarded as "routes to low mortality in poor countries" (Caldwell 1986: 171). Radical socio-economic reform and rapid economic growth have occurred in China since the late 1970s. This profound socio-economic transformation has brought about both positive and negative changes in social security and health care systems. Some of them, for example, the collapse of the Cooperative Medical System in many rural areas, have created difficulties for the further improvement of public health. Growing inequality in income distribution has also made the reduction of mortality difficult to achieve in poor areas and among disadvantaged population groups. Although China's mortality has continued to fall in the last 25 years, and life expectancy has now reached 72 years, the country also faces great challenges in the further development of healthy longevity.

This chapter begins with a brief review of the epidemiological transition and increasing longevity in the world. It then discusses the mortality decline that has been observed in China in the last 50 years and some of the major changes in health care brought about by recent socio-economic reforms. Then the chapter examines the increasing inequality in health care and mortality across different areas and population groups. It next comments on major challenges in raising healthy longevity and some of the related issues. The chapter concludes with a brief summary.

16.1 Epidemiological Transition, Increasing Longevity and the Emergence of the Ageing Society

Although this chapter is about inequality in health care and healthy longevity in China, we begin with a brief review of the epidemiological transition, increasing longevity, and the emergence of the ageing society in the world. This discussion will help us place China's mortality decline in the context of world demographic changes and highlight China's major challenges in further improving public health and longevity.

Mortality was high throughout most of human history. Although considerable fluctuations in mortality were recorded in the past, its continuous and long-term decline did not begin until the second half of the eighteenth century (Laslett 1995). The mortality decline has been closely related to changes in major causes of death. They together are frequently referred to as the epidemiological transition.

According to Omran, before the start of the epidemiological transition, people lived in the "age of pestilence and famine" when mortality fluctuated around a high level. Average life expectancy at birth was low, ranging between 20 and 40 years. During this time, the major cause of death was infectious diseases occurring in pandemics. "The age of receding pandemics" started in some countries from the second half of the eighteenth century. During this transitional stage, the threat of infectious diseases decreased gradually, and mortality fell to a lower level. Life expectancy at birth rose from about 30 years to about 50 years. This led to "the age of degenerative and man made diseases," when deaths were largely caused by chronic degenerative diseases such as cardiovascular diseases and cancers. Life expectancy at birth further increased to 50 years and above (Omran 1971, 1983).

When Omran first proposed this theory, death rates due to some of the degenerative diseases had already fallen in some developed countries, and they have continued to decline further. This has resulted in a continuous increase in life expectancy. Olshansky and Ault accordingly revised the epidemiological transition theory by adding a fourth stage, namely, "the age of delayed degenerative diseases." During this stage, the major degenerative causes of death remain as the major killers, "but the risk of dying from these diseases is redistributed to older ages" (Olshansky and Ault 1986: 361). According to this theory, most of the developed countries in the world have already entered the fourth stage of the epidemiological transition, where the major causes of deaths are degenerative diseases, and mortality has fallen to a very low level.¹

One of the direct outcomes of the epidemiological transition is the persistent rise in life expectancy and the notable increase in the recorded maximum length of the human life span. Oeppen and Vaupel (2002) studied mortality changes in the world and found that life expectancy in record-holding countries (i.e. countries with the lowest mortality in a given time) has risen steadily since 1840. In the female population, for example, life expectancy has increased in an extraordinary linear fashion at a rate of almost 3 months per year. There is no sign that this trend will stop soon (Oeppen and Vaupel 2002). Because of this change, most of the developed countries now have a life expectancy at birth of around 80 years.

In the age of pestilence and famine, it was very difficult for an individual to survive to advanced ages. When the average life span was only some 30 years or less people rarely lived to 70 years, as suggested by a Chinese proverb, let alone a hundred years. A statistical analysis conducted by Wilmoth also shows that it was very difficult for people to live to 100 years, and it was almost certain that no people survived to 110 before the year of 1800 (Wilmoth 1995). The rapid increase in the number of very old people is largely a phenomenon of the twentieth century. As indicated by the data assembled by Kannisto and other researchers, in twelve selected developed countries (Austria, Belgium, Denmark, England and Wales, Finland, France, West Germany, Italy, Japan, Norway, Sweden and Switzerland) with the most accurate population data, the number of people aged 80–89 increased by four times during the period from 1950 to 2000. But those aged between 90 and 99 increased 15 times, and those aged 100 and over increased almost 50 times from just over 800 to about 40,000 people (Kannisto 1994; University of California at Berkeley and Max Planck Institute for Demographic Research 2006).

These changes have led to the emergence of an ageing society, or what Laslett called "the emergence of the third age" (Laslett 1989). The most important demographic feature of such a society is the increase in the proportion of old people and the gradual increase in the age of the population. This chapter is not about the ageing society itself, and a detailed discussion of this topic is beyond its scope. However, it is useful to briefly mention some characteristics which have been widely observed

¹ For recent discussion on the epidemiological transition, see Olshansky et al. (1998) and Vallin (2005).

in developed countries and are most relevant to the issues that will be examined in the remaining part of this chapter.

In most developed countries such as the twelve mentioned above, demographic changes and the epidemiological transition started earlier than in other parts of the world. By the year 1900, mortality in many of these countries had already declined to a relatively low level, and life expectancy at birth had reached around 50 years. People in most of these countries have enjoyed a high standard of living for quite a long time. Per capita Gross Domestic Product at purchasing power parity is high in all these countries. Their human development indices are at the top of the list in the world. The level of socio-economic equality is also relatively high in most of these countries, where fairly good support is available for poor and disadvantaged peoples. Most of these countries have well-established health care systems and social security systems. According to an evaluation made by the World Health Organization (WHO) in a report published in 2000, the level of fairness in financial contribution to health care is high in all these countries, and regional variations in public health and mortality are relatively small. In most of these countries, government spending on health care is relatively large and has been increasing in recent years. All these are obviously some of the major contributing factors that have led to mortality decline, and they are likely to be important conditions for further increases in life expectancy.

16.2 China's Mortality Decline and Recent Changes in Health Care

Levels of mortality level were high in historical China (Barclay et al. 1976; Zhao 1997; Lee and Wang 1999). While survivorship improved in some areas in the first half of the twentieth Century, the crude death rate for the national population "was close to 40 per thousand population in 1930 and stayed that high or higher during most of the 1930s and 1940s" (Banister 1987: 80; Campbell 2001). Life expectancy at birth was likely less than 35 years. China made very impressive progress in reducing mortality between the early 1950s and the late 1970s, although it was interrupted severely first by the Great Famine and then by the social upheavals in the early years of the Cultural Revolution. According to low but perhaps more reliable estimates, China achieved great success in lowering mortality. Life expectancy at birth increased to 50 years in 1957, to 61 in 1970 and to 65 in 1981, a gain of about 10 years per decade for some 30 years (Banister 1987: 116).² This is not only faster

² The most rapid improvement was recorded between 1950 and 1957. During this period, the fall in mortality was dramatic and the life expectancy at birth rose between 15 and 20 years. Data provided by China's Population Information and Research Center indicate that life expectancy at birth for the national population rose to 56 in 1957, to 64 in the early 1970s and to 68 in 1981 (Huang and Liu 1995). These figures likely under-represent actual mortality levels because of the under-registration of deaths.

than that recorded in Europe, but also surpasses what was observed in Japan and Korea in recent decades (Zhao and Kinfu 2005).

Rapid socio-economic changes have occurred in China over the last 25 years. According to unadjusted (for inflation) figures, China's GDP rose about 32 fold from 362.4 billion yuan in 1978 to 11725.1 billion yuan in 2003. Results based on comparable/standard prices show a slower growth, but the resulting indices still increased from 100 to 940 during this time (National Bureau of Statistics (NBS) 2004). Thanks to this achievement, standards of living have greatly improved despite the fact that China's total population increased by some 300 million during this period, which is about the size of the population of the United States in 2007. According to recent estimates made by the World Bank, in China the number of people living under the poverty line of one dollar per day decreased by over 420 million, from 633.7 million in 1981 to 211.6 million in 2001. This played an important part in poverty reduction in the world where the number of people living under the poverty line fell by 390 million during the same period (Chen and Ravallion 2004). Because of these changes, the health status of the Chinese population as a whole has continued to improve. Unlike the republics of the former USSR and some of the Eastern European countries where mortality stopped declining or even increased during their recent reconstruction (Mesle 2004), China's life expectancy at birth has reached 72 years—a level well above the world average, but ten years lower than the world record (Population Reference Bureau 2004; Ren et al. 2004).

Because of these changes, the number of very old people increased rapidly in China. According to published census results, from 1953 to 2000 the number of people aged 80–89 increased by six times from less than two million to eleven million. The number of those aged 90–99 increased by 14 times from 68,000 to 953,000. (See the first chapter in this volume by Poston and Zeng for more discussion.) In these age groups, recorded mortality rates have also shown some decrease in recent years. According to the 2000 census, however, mortality rates for China's elderly population (up to age 94) are still notably higher than those recorded in many developed countries.

It is difficult to estimate the change in the number of centenarians, because this figure has been over-reported in China's early censuses. For example, the 1953 census reported 3,384 centenarians, which is four times the 809 centenarians recorded in the twelve developed countries mentioned earlier, although the number of Chinese who were aged 90–99 is less than half that of their counterparts. While considerable improvement has been made, age misreporting at the very old ages is still noticeable in recent censuses (Fan 1995; Zhuang and Zhang 2003).³ This issue along with registration problems of other kinds may contribute to the relatively low mortality recorded among those aged 95 and above.

³ For example, in the year 2000, China's mortality was notably higher and life expectancy was some eight years lower than the corresponding figures in the twelve developed countries mentioned earlier. However, the ratio of centenarians to people aged 90–99 was 0.019 and slightly higher than that in the 12 countries. This could be a result of age misreporting at the very old ages.

China's recent socio-economic reforms have significantly transformed Chinese society and made China a new powerhouse for economic development in the world. However, this transformation has also brought about some negative changes. They are particularly noticeable in the area of health care and are summarized in the next few paragraphs.

Firstly, China's health services have been commercialized considerably during its recent market oriented economic reforms and have increasingly become profit driven. As a result, the cost of health care has risen sharply. An estimate produced by the Ministry of Health (MOH) shows that in comparison with 1990, per capita income in 1999 increased by 288 percent and 222 percent in China's urban and rural areas, respectively. However, the cost of medical care grew at an even faster pace; the cost of visiting doctors (*menzhen*) rose by 625 percent and that of in-hospital treatments (*zhuyuan*) by 511 percent during the same period (Rao and Liu, 2004: 51).⁴ The high costs have already become a major obstacle preventing many people from receiving needed medical treatment.

Secondly, many workers and peasants have lost their health care coverage because of recent changes in the health care system. In the late 1970s, more than 75 percent of urban employees and retirees were covered by the Government Insurance Scheme or Labour Insurance Scheme, and benefits were often extended to their dependents. Co-operative Medical Systems were set up in 90 percent of China's rural areas (Wu 2003: 234 and 244). According to the National Health Service Survey (NHSS) conducted by the MOH in 2003, the proportion of people covered by various health insurance schemes was moderate, even though it had increased from a lower level in the early 1990s. Even in large and medium cities, some 40 percent of people did not have any health care coverage. In rural areas the figure was almost 80 percent (Center for Health Statistics and Information (CHSI) of MOH 2004).

Thirdly, due partly to the commercialization of health care services, China's total health expenditures rose by 40-fold from 14.3 billion *yuan* in 1980 to 568.5 billion *yuan* in 2002, or from 3.2 to 5.4 percent of GDP. These increasing costs have fallen largely on individuals. Government health spending as a percentage of GDP actually decreased from 1.1 to 0.8 percent, but the total amount spent by individuals as a percentage of GDP increased from less than 0.7 to 3.2 percent. Measured in absolute terms, the health expenses paid by individuals increased from 3.0 billion *yuan* to 331.4 billion *yuan*, or about 110 times (Rao and Liu 2004: 37).⁵ This pattern is radically different from that in most developed and many less developed countries where government expenditures on health are far greater than the contributions made by individuals (WHO 2004).

Fourthly, medical services in China's large cities and less developed rural areas have become more polarized than before. Medical facilities in large cities and developed areas have improved in recent years. The gap between these places and

⁴ The rate of income increase would be somewhat different were it computed with data published by NBS, but would still be markedly smaller than the increase in the cost of visiting doctors and in-hospital treatments (NBS 2004).

⁵ These figures are estimated from the data presented by Rao and Liu and not adjusted for inflation (Rao and Liu 2004: 37).

developed countries in the number of medical professionals and in types of health services they offer has become small in recent years. In contrast, government investment in health has been inadequate in less developed rural areas where the number of medical professionals actually decreased at the grass-root level. According to the figures reported by MOH, while the number of medical professionals working in county-level hospitals or health facilities of other kinds increased slightly from 1.3 million in 1977 to 1.5 million in 2003, the number of village doctors (formerly known as "barefoot doctors") decreased from 1.8 to 0.8 million and the number of health workers (*wei sheng yuan*) decreased from 3.4 to 0.8 million during the same period (Rao and Liu 2004: 35).

Fifthly, the inequality in income distribution has grown at a startling speed, and wealth has increasingly become controlled by a small number of people. The Gini index increased from 0.31 in 1985 to 0.42 in 2001, according to Wu and Perloff (2004). While others have made different estimates, they all generally agree that disparities in income and wealth have reached an alarming level (Meng 2004; China Daily 2004). This stark inequality has also been noted by the United Nations (2005). China's recent reforms have broken the "iron rice bowl."⁶ Many poorly managed companies and factories have undergone bankruptcy during the last 20 years, and their former employees have lost their jobs.⁷ Changes of a similar nature have also been observed in the rural areas. Unemployment, along with other factors, often leads to poverty. Accordingly, the rapid socio-economic changes have produced not only the new rich, but also the new poor.⁸

16.3 Inequality in Health Care and Variation in Morbidity and Mortality⁹

The changes discussed in the preceding sections have resulted in increases in the inequality in health care in China and have had a marked impact on public health and mortality improvement. Although impacts of this kind are often difficult to detect from health or mortality statistics aggregated at the national or provincial levels, they have already reached a critical level and threaten the potential of future economic growth, and to some extent the stability of the society. This section discusses some of these problems via an examination of data collected by the NHSS in 2003, the population census undertaken in 2000, and data gathered from National Diseases Surveillance Points in the late 1990s.

⁶ This is a Chinese phrase often used to refer to the guaranteed job provided by the government and state.

⁷ According to the NBS, registered urban unemployment rates have varied between 3 and 5 percent in most provinces in recent years (NBS 2004). The actual figures are likely higher.

⁸ While the number of people living under the poverty line has decreased greatly in China since the start of the reforms, a recent health survey revealed that there were still 7.2 percent of surveyed households receiving financial support from governments (CHSI of MOH 2004).

⁹ This section summarizes some of the research findings reported in Zhao (2006), where a more detailed discussion may be found.

16.3.1 Considerable Variation in the Availability of Health Services, Living Standards and Sanitary Conditions

According to the NHSS, there is still a huge gap in the availability of healthcare services, standards of living and sanitary conditions between China's advanced and less developed areas, as shown in Table 16.1.

The NHSS collected detailed data on the economic status, health conditions, participation in health care systems, use of health facilities, and other relevant information from 194,000 respondents and 57,000 households selected from 28 districts and 67 counties. These districts and counties, which had a total population of approximately 45 million at the time of the survey, were sampled from, and also grouped into, three types of cities and four types of rural areas (CHSI of MOH, 2004). The major criterion for grouping the cities is their population size. As in many other countries, the population size of Chinese cities is related to the level of socio-economic development.¹⁰ Large cities generally are regional or national economic centers, while the medium-sized and especially the small cities tend to be in remote and less developed areas. Rural areas are classified into four categories according to their levels of socio-economic development. Type I includes China's advanced and rich rural areas; Type II areas are not as developed as the Type I areas, but peasants in these places can have a reasonably comfortable life; Type III areas consist of those where food, clothing and other living necessity have reached just adequate levels; and Type IV includes China's least developed and poor rural areas.

Table 16.1 Disparities in the availability of health care, living standards and sanitary conditions 2003

	Cities			Rural areas			
	Large	Medium	Small	Type I	Type II	Type III	Type IV
Number of doctors per 1000 population	5.8	4.4	1.7	1.3	1.0	0.8	0.6
Number of nurses per 1000 population	5.8	4.8	1.4	1.1	0.7	0.6	0.4
Proportion having no medical care coverage	38.5	41.2	55.0	67.8	80.7	88.6	70.8
Per capita income (yuan)	8292	6607	4589	3163	2187	1938	1187
Per capita expenditure (yuan)	6297	4791	3524	2466	1763	1666	1039
Proportion of households using tap-water	99.5	99.8	87.6	49.3	31.1	27.4	30.1
Proportion of households using flush toilets	86.1	93.5	57.6	13.5	4.1	2.1	1.2

Sources: CHSI of MOH (2004).

¹⁰ Chinese cities are often divided into three groups according to their population size: cities with a population of less than 200,000 are defined as small cities; those with a population between 200,000 and 500,000 are defined as medium cities; and those with a population of over 500,000 are defined as large cities (The Standing Committee of the National People's Congress 1989).

In general, more people engage in agricultural production in the least developed rural areas as compared to the advanced rural areas.

Table 16.1 reveals great disparities between the advanced and less developed areas in the availability of health services, standards of living and sanitary conditions. In large cities, there are 5.8 doctors and 5.8 nurses for every 1,000 residents. In contrast, there is only 1 such medical professional (0.6 doctors and 0.4 nurses) per 1,000 population in Type IV rural areas. In large cities, a hospital serves an area of 1.4 square kilometres and 14,800 people on average, but in the least developed (or Type IV) rural areas, a hospital serves an area of 1,047 square kilometres and 103,000 people on average. This makes it very difficult for those with acute health conditions to get high quality and timely treatment.¹¹ In large and medium-sized cities more than 60 percent of the people are covered by some kind of health care scheme, but in most of the rural areas, people without any health care coverage account for about 80 percent of the population. Because of the shortage of health facilities and health professionals, people in the less developed rural areas are disadvantaged in their ability to access knowledge about health care and health services. For example, while in large and medium cities, 94 percent of respondents had some knowledge or had heard about HIV/AIDS, only 40 percent of respondents in Type IV rural areas had such knowledge.

There is also a large gap across these areas in people's standard of living and living environment. As shown in Table 16.1, in large cities average annual income and expenditures are seven times and six times, respectively, those for Type IV rural areas. In many rural areas, especially in Type IV rural areas, the income level is well below the internationally recognized poverty line of one dollar per day. Such a low living standard directly affects people's nutritional intake which in turn makes them vulnerable to many diseases. In China's poor rural areas, more than 20 percent of children below age 5 are under weight for their age, and infant mortality is high; this is a clear indication of such an impact (Rao and Liu 2004). In addition, people in less developed rural areas usually live in a hygienically inadequate environment. For example, compared with large and medium-sized cities where almost 100 percent of people use tap-water and around 90 percent of households have flush toilets, in Type III and IV rural areas, less than one-third of the people use tap-water and about 90 percent of toilets are regarded as unhygienic (CHSI of MOH 2004: 70). It is important to note that all of these factors are closely related to morbidity patterns and the level of mortality, which will be discussed later.

16.3.2 Increasing Inequality in the Accessibility of Health Services

Because of the increasing inequality in healthcare coverage and in the distribution of income and wealth, great intra-regional inequality in healthcare has become a major social problem. This has also had in recent years a considerable effect on the

¹¹ There are clinics and health stations in some of the poor areas, but they are usually not equipped to treat complex health problems.

improvement of public health. This is particularly the case with regard to patients' access to health services, as shown in Table 16.2.

According to the NHSS, about 28,000 out of nearly 200,000 respondents, reported having suffered from various types of illness during the two weeks before the time of the interview. Slightly more than half of them visited doctors for treatments, and a total of 26,000 visits were recorded. As indicated by Table 16.2, nearly half of those suffering from various kinds of health problems did not see doctors for treatment. Some people treated the illness themselves, and 13 percent did not have any treatment at all. In large and medium-sized cities and in Type I and Type II rural areas, about one-third of those who did not receive any treatment did not do so due to economic hardships. In small cities and in Type IV rural areas, the proportions were markedly higher and close to 50 percent. Poverty and inequality have noticeably influenced people's access to medical services. Even in large cities, 3 percent of all patients could not get the needed treatment because of economic difficulties. The impact was greater in the least developed rural areas where nearly 10 percent of patients were not treated because they did not have the financial resources.¹²

Table 16.2 Proportions of patients visiting doctors or getting in-hospital treatments

	Cities			Rural areas			
	Large	Medium	Small	Type I	Type II	Type III	Type IV
Number of person-time visits to doctors in the two weeks before the survey (per 1,000 people)	119.7	92.6	138.2	115.7	145.7	158.0	118.3
Proportion of patients who did not visit doctors for treatment	57.7	63.8	48.9	49.8	43.0	46.7	43.0
Proportion of patients who did not have any treatment	10.7	7.6	10.6	11.9	12.8	15.5	18.9
Proportion having not had any treatment because of financial difficulties	30.8	32.7	47.0	29.2	33.9	41.2	49.1
Number of person-time hospitalizations in the previous year (per 1,000 people)	40.3	46.0	41.6	34.2	30.1	35.7	36.5
Proportion of in-patients asking for early discharge from the hospital	32.6	31.8	38.8	39.0	45.2	53.5	47.5
Proportion asking for early discharge because of financial difficulty	40.8	50.8	65.1	66.8	62.9	68.2	73.2
Proportion of patients who ought to but did not have in-hospital treatment	23.3	31.3	28.7	23.2	27.1	35.8	31.2
Proportion not receiving in-hospital treatment because of financial difficulty	64.4	35.6	74.8	77.6	74.9	75.5	73.6

Sources: CHSI of MOH (2004).

¹² These figures are derived by multiplying the proportion of patients who did not have any treatment (figures in row three of Table 16.2) by the proportion not having had any treatment because of financial difficulty (the figures in row four of Table 16.2) and then dividing by 10,000.

Influence of this kind is more observable in people's accessibility to in-hospital treatment. The NHSS also recorded that nearly 6,000 patients were hospitalized for a total of about 7,000 times for treatment during the year prior to the survey. Because of the high cost of the in-hospital treatment, which almost equals a person's average annual income, 43 percent of in-patients asked to be released from hospitals before the date recommended by their doctors. This proportion is highly related to the level of socio-economic development, people's income and the percentage of respondents covered by various medical care schemes in each type of area.¹³ As expected, the majority of those asking for an early discharge did so because of economic hardship. In large cities, 41 percent of patients who wanted to be released earlier did so due to financial difficulty, and in Type IV rural areas the figure was as high as 73 percent. In addition, there was also a large number of patients who should, but did not, have any in-hospital treatment at all, varying from 23 to 36 percent across the seven types of areas. Again, economic difficulty was the major determinant for such decisions. In small cities and in rural areas, three quarters of those who should, but did not, have the in-hospital treatment did not do so because of this reason. In medium-sized cities, the proportion of patients who did not receive in-hospital treatment because of financial difficulty was noticeably lower than in all other areas. This was likely caused by reporting or coding problems in one district (the Lubei District, Hebei Province) where 85 per cent of those who should, but did not, have in-hospital treatment reported that they felt the treatment was unnecessary and only 9 percent reported that they did not seek treatment due to financial difficulties. If this district is excluded, then in the medium-sized cities the proportion of patients not getting in-hospital treatment because of financial difficulties increases from 36 to about 63 percent, which is very close to the proportion in large cities, which is 64 percent.

16.3.3 Great Disparities in Causes of Death and Mortality

The striking gap in living conditions and in the availability and accessibility of health services directly results in great disparities in public health and in mortality patterns between the advanced and the less developed areas. As indicated by Table 16.3, there is great variation in morbidity patterns and major causes of death across regions with different levels of socio-economic development. The NHSS reveals that a larger proportion of urban than rural respondents reported that they suffered from cardiovascular diseases during the two weeks before the survey. Cardiovascular diseases comprise more than one third of all reported diseases in large cities, but account for less than one tenth of the diseases in Type IV rural areas.¹⁴ In

¹³ These conclusions are supported by the analysis of data recorded at the individual level, which was conducted by CHSI of MOH (2004).

¹⁴ This may be partly related to the fact that in less developed rural areas there is a lack of accurate diagnosis, and many people are not aware of these and some other types of non-communicable diseases.

Table 16.3 Variations in mortality and causes of death

	Cities			Rural areas			
	Large	Medium	Small	Type I	Type II	Type III	Type IV
Proportion of deaths by							
Infectious and maternal diseases ^a	3.8	3.9	6.2	4.4	6.1	11.4	23.1
Non-communicable chronic diseases	84.2	80.8	74.7	80.9	78.6	70.3	60.6
Injury and poisoning	6.0	7.4	4.8	10.3	11.2	13.1	10.2
Unknown reasons	6.0	7.9	14.3	4.4	4.0	5.1	6.1
TB prevalence rate (per 100,000 population)	37.3	69.9	150.1	81.1	96.3	140.8	223.2
Average life expectancy at birth	77.7	77.7	75.7	73.8	73.0	71.3	65.2
Average infant mortality rate in 2000	6.0	8.6	14.5	14.1	24.2	30.6	54.0

Sources: Department of Control Disease of MOH and Chinese Academy of Preventive Medicine 1997 and 1998. The life tables for these districts and counties are provided by Yong Cai. CHSI of MOH, 2004.

^a See the text for the classification of these categories.

contrast, the proportion of people who reported to have suffered infectious diseases, digestive diseases, and respiratory diseases was greater in the less developed rural areas than in the large and medium-sized cities. A notable example is the difference between China's advanced and less developed areas in their TB prevalence rates. According to the data collected by the NHSS, the TB prevalence rate is 37 per 100,000 in large cities, but is significantly higher at 223 per 100,000 in Type IV rural areas. These results are computed based on patients who coughed continuously for at least three weeks and were then diagnosed with TB in hospitals. The adjusted rates, which were estimated by the MOH and included patients who had the disease but had not been diagnosed in this way, were noticeably higher.¹⁵

The results are supported by the causal structure of deaths observed from China's disease surveillance points. As shown in Table 16.3, in China's large and medium-sized cities and in advanced rural areas, the major causes of death are very similar to those in developed countries. The overwhelming majority of deaths were caused by cancers, heart diseases, cerebrovascular diseases and other non-communicable diseases. The proportion of those dying from infectious diseases is low. In contrast, in Type III and IV rural areas, the proportion of deaths due to non-communicable chronic diseases is much lower; and deaths caused by infectious diseases, diseases of upper respiratory tract, pneumonia, influenza, maternal diseases, and diseases

¹⁵ The MOH adjusted rate for the surveyed population is 153.4 per 100,000, which is notably higher than the 115.6 per 100,000 computed according to the above method (WHO 2004).

originating in the perinatal period are considerably higher.¹⁶ This pattern is very similar to that found in many less developed countries.

The marked gap in public health and morbidity patterns also affects and is reflected in the level of mortality. There is a strong positive relationship between life expectancies at birth and levels of socio-economic development.¹⁷ Life expectancy at birth in large cities is more than 12 years greater than in Type IV rural areas. When examined at the district and the county levels, the gap between the highest and lowest life expectancies is even larger and is close to 20 years. Great disparities of this kind also exist in infant mortality. According to data in the 2000 census, the recorded infant mortality rate in large cities was 6 per 1,000 and very close to the lowest in the world, but in Type IV rural areas it was 54 per 1,000, or nearly 10 times higher. High infant mortality in less developed rural areas is directly related to poor access to effective medical services. Data collected from China's disease surveillance points show that in rural areas in 1998 the infant mortality rate due to pneumonia was about 15 times that in urban areas (Department of Disease Control of MOH and the Chinese Academy of Preventive Medicine 1998). Had timely treatment been available or easier to access in less developed rural areas, many of these lives could have been saved.

16.4 Challenges to Healthy Longevity

The problems examined in the last two sections have already become major obstacles in improving public health. They are also major challenges for further increasing life expectancy and for understanding and promoting longevity, which are discussed below under two sub-headings.

16.4.1 Improving Healthy Longevity

A number of observations can be made from the evidence presented up to this point. Because of the deterioration of China's health care system in the 1980s and the recent spiralling increase in the cost of medical services, it has become difficult for poor or disadvantaged people to obtain adequate medical care. It is alarming that financial difficulties were the reason that in less developed rural areas more than half (52 percent) of the patients who needed to have in-hospital treatments either

¹⁶ This is rather similar to the causal structure of death found in many less developed countries. These patterns are generally consistent with those described by epidemiological transition theory and observed in other populations (Omran 1971, 1983).

¹⁷ These life expectancies are obtained from the life tables constructed by Yong Cai on the basis of unadjusted mortality data gathered in the 2000 census. Studies have shown that the 2000 census under-recorded deaths (Li and Sun 2002). However, because detailed information is not available, we are not able to adjust recorded mortality rates. While the recorded life expectancies might be slightly higher than the actual ones, the marked difference in mortality among the different areas as indicated by these data is reliable.

could not have them or had not completed the in-hospital treatment recommended by doctors.¹⁸ The problem has become so severe that some Chinese officials have recently suggested that China's healthcare reform is largely a failure (Bai 2005). The impact of increasing inequality in income distribution and healthcare on population health is also indicated by the fact that between 1981 and 2000, infant mortality fell by 59 percent in large and in medium-sized cities, but the reduction was only about 30 percent in small cities and in poor rural areas. The disparity in mortality between advanced and less developed areas has actually increased (Zhao 2006).

Evidence also shows that because of the changes and problems examined above, there have been some downward trends in improving public health. In addition to the great reduction in the number of village doctors, the proportion of children receiving immunizations or vaccinations has decreased in recent years (CHSI of MOH 2004; Riley 2004). The prevalence rate of TB has remained high and has increased in some areas. This is particularly the case among the poor and among temporary migrants who often live under crowded and poor living conditions. TB kills many more people each year than most other infectious diseases.¹⁹ The increase in HIV/AIDS, in poor and in less developed areas in particular, is another example. According to data published by official reports, more than 800,000 people have been infected by the virus since it was first recorded in China, and AIDS may become a major killer in China if it can not be controlled effectively (State Council AIDS Working Committee Office and UN Theme Group on HIV/AIDS in China 2004). Partly due to these changes, China's recent mortality decline has become slower in comparison with that recorded in earlier periods, and its mortality advantage over countries with similar levels of development, which greatly impressed the world in the 1970s and 1980s, has largely disappeared.

Poverty is an important reason for poor health, and this has been illustrated by the research findings reported in the last section. Poor health, especially in a society where an effective healthcare system does not exist, could also lead to poverty. This is readily observable in China's less developed areas and disadvantaged population groups. According to a survey conducted in China's poor rural areas and reported by Rao and Liu (2004), high medical costs have already become a heavy financial burden and a major cause of poverty in many families. The medical expenditures in about 18 percent of the surveyed families were actually greater than their total incomes. Nearly a quarter of the 11,353 surveyed households borrowed money, and 5.5 percent of them sold their properties or belongings to pay their medical bills. According to the 1998 NHSS, after paying their medical expenses, the proportion of poor people in rural areas increased from 7.2 to 10.5 percent (Rao and Liu 2004).

¹⁸ In another study, Rao and Liu reported that in China's rural areas, 37 per cent of the patients ought to, but did not, see doctors for treatment, and 65 per cent of the patients should, but did not, have in-hospital treatments (Rao and Liu 2004: 47).

¹⁹ According to the NHSS, the MOH adjusted rate is 153.4 per 100,000 in the surveyed population. According to a recent WHO health report, China's TB prevalence rate was 250 per 100,000 in the year 2000, which is noticeably higher than the rate published by the Chinese government (WHO 2004).

51–52). Poverty thus exerts a further impact on the health of these impoverished people, and a new cycle begins again.

Old people, especially those without a pension and healthcare coverage, are particularly vulnerable to the influence of both poor health and poverty. For example, while it is less observable in cities, healthcare provided to old people is often less adequate than that provided to the general population in rural areas. This is indicated by the fact that in rural China, 45.8 percent of people of all ages who suffered from various diseases during the two weeks before the 2003 NHSS did not visit doctors for treatment, compared to 51.6 percent who did not do so among those aged 65 and above. Similarly, among those who should have in-hospital treatment, 30.3 percent did not have such treatment in the population of all ages, but 44.4 percent did not have the required treatment among people aged 65 and over. Restricted medical care of this kind greatly prevents older people from maintaining good health and could reduce their life span considerably.

To stop the negative trends discussed above and to meet the challenges in improving healthy longevity, there is a need to control the rapid increase in the price of medical services. This is a relatively easy step in improving accessibility to medical care. The government needs to invest more in public health, especially in providing help to less developed areas and disadvantaged people. After a quarter of a century of successful reform and economic growth, the government is now in a much better position to provide such support than was the situation during the pre-reform period. Moreover, further actions need to be taken to re-establish and consolidate a nationwide health insurance system. The current health care coverage simply cannot meet people's immediate and, especially, long-term health needs. China has made some progress in recent years in developing a medical care system, but further effort is crucial.

16.4.2 Understanding the Process of Increasing Longevity

The discussions presented in this chapter and elsewhere in this book also raise another question which is of considerable importance for the study and our understanding of longevity. In comparison with countries such as the 12 developed countries mentioned earlier, China's censuses and some surveys often recorded a relatively large number of very old people, especially centenarians. These centenarians also tended to concentrate in some of the less developed areas. For example, a large number of centenarians were recorded in Xinjiang and Guangxi. In these two autonomous regions, many centenarians were reportedly living in the counties of Hotan and Bama, and both places have thus been regarded as the "home of longevity" (Xing and Zhang 2005; People's Daily 2003). However, both the Hotan and Bama Counties were also defined by the Chinese government as poor counties where per capita annual income was below 700 yuan in 1994. The two counties are included in China's least developed areas. According to unadjusted census data, life expectancy at birth in 2000 was only about 65 for Hotan County and 70 for Bama County, lower than the national average.

The following example further illustrates this rather unusual situation. Sweden and Japan are two very wealthy countries in the world where life expectancies at birth have reached more than 80 years. In 1998 there were 15 and 17 centenarians per 1,000 people aged 90 and above in the two countries respectively. In contrast, the standards of living and healthcare availability levels were much lower in China's Guangxi Autonomous Region where life expectancy at birth was about 10 years lower. Despite such huge gaps, however, there were 40 reported centenarians for every 1,000 people aged 90 plus in Guangxi in 1990—a ratio that is far greater than those recorded in Sweden and Japan.

Here we have a paradoxical situation. The brief review presented in the first section of this chapter suggests that while it was possible in the past for a small number of people to survive to an advanced age or to even become centenarians when mortality was relatively high, a large increase in the proportion of very old people, centenarians in particular, is a relatively new phenomenon taking place largely in the second half of the twentieth century. This was first observed in developed countries where standards of living and levels of healthcare are both high, which are important contributing factors for lowering mortality. The reduction of mortality across all age groups is an important condition for the increase in the number of the oldest old. If these suggestions are true, why have so many centenarians been reported in China where levels of socio-economic development and health care are much lower and where overall mortality is considerably higher than in most developed countries? Why have many of China's centenarians been reported in its less developed areas where standards of living are still very low?

An important step in solving this puzzle is to find out whether there were really as many centenarians as reported in places like Xinjiang and Guangxi. If they are indeed "homes of longevity" and have considerably higher proportions of centenarians, we not only need to find out the major factors or conditions that promote healthy longevity, but also need to reassess existing theories of epidemiological transition and increasing longevity such as those summarized earlier. It becomes important, for example, to address these questions: (1) to what extent do lowering mortality in the whole population and improving public health contribute to increasing healthy longevity; and, (2) what are the reasons that make China's old people (compared with old people in other national populations) vulnerable to the risk of death when they are relatively young but more invincible after age 95 or 100.

If however the relatively large number of centenarians is not genuine but a result of misreporting, it is also important to assess the impact of such problems on our understanding of the process of increasing longevity and on the conclusions drawn from these data. Studies have already shown that a large number of centenarians recorded in Xinjiang in 1982 was largely a result of age mis-reporting (Coale and Li 1991). Whether problems of the same nature existed in Guangxi (which has also claimed to be the "home of longevity") or other places needs further investigation. The outcome of such investigations will have important policy implications. If the number of centenarians in places like Xinjiang and Guangxi is not as large as is being reported, and if lowering the mortality of the entire population and improving public health are still vital conditions for increasing levels of longevity of the oldest

old, then the effort, especially that made by the government, perhaps should be directed to the promotion of public health and equality in healthcare rather than to the promotion of various "homes of longevity." The objective of such efforts is not finding a large number of centenarians, but rather finding ways to help the majority of the population gain a longer and healthier life. This would be very difficult to achieve if the problems addressed in this chapter could not be solved effectively.

16.5 Conclusion

China made very impressive progress in reducing mortality in the last half century. However, further improving healthy longevity in the population is a serious challenge. In addition to raising the standard of living, which China has done remarkably well during its recent economic reforms, it is also essential that China improves its healthcare system and reduces the inequality in the availability of, and accessibility to, healthcare services. It is important to recognize the fact that compared with many other countries in the world, China's mortality level is still relatively high; there are still many people who die of infectious diseases; regional variations in causes of death and mortality patterns are still very pronounced; and the level of healthcare and services is still low. Further efforts need to be made in these areas if China wants to maintain its success in lowering mortality and to continue to improve public health. In a population where a considerable number of people live under the poverty line, the majority do not have any healthcare coverage and many people can not obtain the requested medical treatments because of financial difficulties, increasing healthy longevity will be difficult to achieve.

Acknowledgments The author would like to thank Cai Yong and Li Li for their help. The author would also like to thank University of Cambridge and Pfizer for their support of this research.

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