

Health and long-term care expenditures of the elderly in Japan using a micro-simulation model

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1. Introduction

Japanese total fertility rate is significantly low (1.32 in 2006), and the Japanese life expectancy is among the longest (79.0 years for males and 85.8 years for females at birth in 2006) in developed countries. Consequently, population aging is proceeding rapidly, which has a strong impact on welfare state reform in Japan. The proportion of the population aged 65 years old or over (65+), 20.8 percent in 2006, is projected to increase markedly to around 40 percent in 2050. The household structures will change significantly in the course of the aging of the population. Especially noticeable is the dramatic increase in the number of elderly households and the elderly living alone. Among the elderly aged 65+, 15.5 percent lived alone and 45 percent lived with their children in 2005 (Note 1). However, living arrangements of the elderly will be influenced considerably by the changes in demography and socio-economic factors, and the proportion of those elderly who need long-term care services increases rapidly with the age increase. Japanese rapid population ageing threatens the sustainability of social security systems, and a great many of policy efforts are devoted towards making social security systems more affordable.

Health Service Program for the Elderly (HSE), for 70+ or 65-69 & disabled, was introduced in 1983 to equalize the burden of health costs of the elderly among various sickness funds and to ask elderly patients for reduced cost sharing (Note 2). Since October 2002, the eligible age for the program was increased to 75 years old with some transitional measures. In 2006 reform, it was decided to create a new health insurance for the elderly aged 75 or over in April 2008. Under the new scheme, all the elderly aged 75+ including those who are dependent will have to pay the contributions.

Per capita health expenditure of the elderly is much larger than that of the non-elderly, and they stay much longer in hospitals. The issue of improper use of hospital beds has been discussed since the 1970s in Japan. Elderly have sometimes been staying in hospitals much longer than the medically appropriate period. Such cases are called "social hospitalization", an induced stay in hospitals caused by social reasons (not medical). The reduction of those hospitalizations is necessary for quality care as well as for cost containment. Under the

circumstances of rapid ageing of the population, how to finance the health expenditure of the elderly is certainly a serious issue.

The rapid aging of the population has also increased the demand for formal long-term care services in Japan, and public Long-term Care Insurance (LTI) has been implemented since April 2000. The principles underlying this program are universality of coverage (although benefits are available mainly for the elderly), financing through social insurance (although the public funds finance about 45% of the cost), freedom of choice by service users, and reliance on a service market (Fukawa, 2001). The main purposes of the program are to share the burden of caring for the elderly among all members of the society and to lessen the burden of family caregivers. But it also has the implication of relieving some of the financial pressures on the health expenditure of the elderly, in which long-term stays of the elderly patients in hospitals have been included (Fukawa, 2001). Many geriatric hospitals in Japan have so far functioned just like nursing homes because of the shortage of facilities for institutional care on the one hand, and because of the excess of hospital beds on the other hand. The conversion of surplus hospital beds from health insurance coverage to long-term care insurance coverage is one of the key issues for the successful development of the Japanese long-term care insurance (Fukawa, 2001).

Micro-simulation models have become very powerful tools in many countries, being used routinely within governments to analyze the distributional impact of policy changes on tax and cash transfer programs (Harding, 1996). A growing number of models have attempted to simulate the changes in the behavior of the individuals directly affected by a policy shock, although the key purpose of static micro-simulation models has usually been to show the immediate impact of a policy change before any of the individuals within the model change their behavior in response to the policy shock (Harding, 1996). There are many examples of static micro-simulation models in Japan (Tajika and Furutani, 2002; Ogura, Kadota and Kawamura, 2006; for example).

Dynamic micro simulation is one method for household projections, in which the state of individuals is to change stochastically through vital

and other events. Contrary to static micro-simulation models, the individuals in the dynamic micro-simulation models are progressively moved forward through time. This is achieved by making major life events- such as death, marriage, divorce, fertility, education, labour force participation etc- happen to each individual, in accord with the probabilities of such events happening to real people within a particular country (Harding, 1996). INAHSIM (Integrated Analytical Model for Household Simulation) is a dynamic micro simulation model, which provides us with a population-household projection in a coherent manner as well as dynamic statistics which are difficult to obtain from static surveys or macro simulation (Fukawa, 2007b).

By using the INAHSIM, we conducted projections of the Japanese household for the period of 2005-2050 (INAHSIM 2007). In this paper, based on the simulation results, we estimated health and long-term care expenditures for the elderly (65+) in future and discuss the cost of supporting the elderly population in Japan. Per capita health expenditure derived from the base year and future numbers of population by age group obtained from the simulation are used to estimate health

expenditures for the elderly in the future. Concerning long-term care expenditures for the elderly in the future, the number of the elderly aged 65 or over according to the physical condition level (explained later; obtained from the simulation) and average care cost concerned for the base year are used. In the estimation, contrary to the health expenditure, it is assumed that long-term care expenditure depends on the physical condition level of the elderly, and does not depend on the age of the elderly.

2. Health expenditure of the elderly

According to the OECD Health Data, the Japanese health expenditure as percentage of GDP was 8.0 percent in 2004 (OECD, 2007). According to the national data (MHLW, 2007), Japanese national health expenditure was 6.6 percent of GDP in 2005 (Note 3). In this paper, we use the national health expenditure instead of the OECD Health Data.

Elderly people consume many more health resources than younger generations. Fifty one percent of national health expenditure, 3.4 percent of GDP, was consumed by the elderly aged 65 or over in 2005, and the ratio is expected to increase further. The elderly expenditure multiple, which is

Table 1 Per capita health expenditure in 2005

Age Group	Population (thousand)	Health expenditure (billion yen)	Per capita health expenditure							
			(thousand yen)			Index (0-9=1.0)				
			A	B	B'	A	B	B'	C1	C2
0-9	11,549	1,814	157.1	157.1	157.1	1.0	1.0	1.0	1.0	1.0
10-19	12,629	902	71.4	71.4	78.6	0.5	0.5	0.5	0.5	0.5
20-29	15,695	1,398	89.0	89.0	94.3	0.6	0.6	0.6	0.6	0.6
30-39	18,567	2,123	114.4	114.4	125.7	0.7	0.7	0.8	0.8	0.8
40-49	15,868	2,353	148.3	148.3	172.8	0.9	0.9	1.1	1.1	1.1
50-59	19,122	4,613	241.2	241.2	252.2	1.5	1.5	1.6	1.8	1.7
60-64	8,577	3,036	353.9	353.9	363.7	2.3	2.3	2.3	2.7	2.5
65-69	7,460	3,306	443.2	465.0	462.4	2.8	3.0	2.9	3.7	3.3
70-74	6,661	4,051	608.2	589.1	636.3	3.9	3.8	4.1	5.0	4.5
75-79	5,280	3,899	738.4	692.8	674.3	4.7	4.4	4.3	6.3	5.2
80-84	3,423	2,850	832.6	774.2	734.5	5.3	4.9	4.7	7.7	6.0
85-89	1,855	1,749	942.9	859.7	825.0	6.0	5.5	5.3	9.6	7.1
90-94	844	835	989.3	840.5	848.1	6.3	5.4	5.4	10.7	7.6
95+	237	201	848.1	745.8	698.3	5.4	4.7	4.4	10.1	6.7
(re) 85+	2,936	2,785	948.6	6.0	9.9	7.2
65+	25,761	16,891	655.7	628.2	627.8	4.2	4.0	4.1	5.6	4.8
0-64	102,007	16,238	159.2	159.2	169.6	1.0	1.0	1.1	1.1	1.1
Total	127,768	33,129	259.3	253.7	262.0	1.65	1.62	1.82	1.86	1.84
Ratio	-	-	4.1	3.9	3.7	-	-	-	5.0	4.3

Note A: F2005, C1: 1999, C2: 2004

B: FSame as A for 0-64. For above 65, the following rates are multiplied to C1:

65-69=0.8, 70-74=0.75, 75-79=0.7, 80-84=0.64, 85-89=0.57, 90-94=0.5, 95+=0.47.

B'= C2 × C2/C1

Source: Author's calculations based on MHLW (2007).

defined as per capita health expenditure of those aged 65+ divided by per capita health expenditure of those aged 0-64, decreased from 4.3 in 2004 to 4.1 in 2005, which is still much higher than that in Germany for example.

Table 1 shows per capita health expenditure by age group as well as per capita health expenditure index relative to age group 0-9. Column A shows the index for 2005 data (Note 4) and column C1 shows the index for the 1999 data which is the last year before the LCI was implemented. The index for the 2004 data is shown in the column C2 for the reference. Comparing the indexes in the columns C1 and C2, it is clear that a considerable part of long-term care which had been included in the health expenditure for the elderly was eliminated between 1999 and 2004. The index in the Column B' is obtained by assuming that what happened between 1999 and 2004 will happen again (Note 5). The index in the Column B is an artificial one to trace the index in the Column B'. For 65+, The index A is lower than the index C1 by 25 percent, and per capita health expenditure increased with age until age group 90-94, but it decreased afterwards. The age pattern of the index B is further mild compared to that of the index A (Fig. 1). This spending pattern by age group causes high elderly expenditure multiple in Japan.

3. Long-term care expenditure of the elderly

Japanese LCI has been implemented since April 2000. Among those who are aged 65 or over, about 13 percent received home-care services or facility-

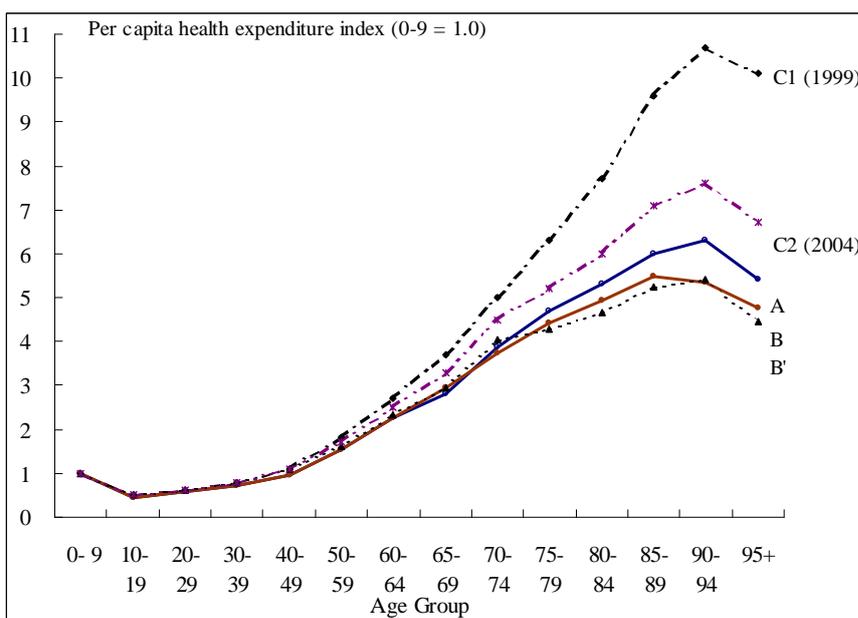
based services in 2005, although 16 percent are eligible to the benefits (Table 2). The number of beneficiaries has been increasing especially rapidly in home-care services (Note 6), and this trend will continue in future years.

The total expenditure of the LCI, mainly used by the elderly, was 3.6 trillion yen or 0.7 percent of GDP when the system was first implemented in 2000 (Note 7). It increased ever since, and amounted to 6.4 trillion yen or 1.3 percent of GDP in 2005 (Table 2). The benefit expenditure, which is total expenditure less user charges, is about 90 percent of total expenditure, half of which is for home care services.

Table 3 shows the LCI beneficiaries and total expenditure of long-term care according to age group among elderly population in 2005. In the INAHSIM, the physical condition of the elderly aged 65 or over is classified into the following four levels: Level 0: No disability and completely independent; Level 1: With some disability but basically independent; Level 2: Slightly or moderately dependent; and Level 3: Heavily dependent.

Levels 2 and 3 correspond to the eligible persons of the LCI, and Level 3 corresponds to care need levels 4 and 5 in particular. The number of the LCI beneficiaries (or users) in Table 3, which is the sum of Level 2 and Level 3 elderly in each age group, corresponds to total users among 65+ in Table 2. The proportion of beneficiaries to the population increased rapidly with the age increase: from 1.2 percent for age group 65-69 to more than

Fig. 1 Per capita health expenditure index according to age group



Source: Table 1

50 percent for age group 95+. The long-term care (LC) expenditure in Table 3 is calculated assuming plausible take-up rates for Level 2 (0.79) and Level 3 (0.95) respectively (Note 8). Therefore, the LC expenditure is calculated for each age group as shown in the Note at Table 3, and the total figure in Table 3 also corresponds to the total expenditure for 2005 in Table 2. Per capita long-term care expenditure in 2005 is calculated for each age group as shown in Table 3.

We denote the long-term care expenditure in Table 3 as D1, and we examine two alternative cases as follows:

D2: assume both take-up rates for Level 2 and Level 3 as 1.0; and

D3: based on D2, assume the proportion of beneficiaries 20 percent lower uniformly.

Table 4 shows the numbers of the elderly according to physical condition levels in future years, which is obtained from the simulation. The long-term care expenditures in future years were calculated using Table 4 for D1, D2 and D3.

As we focus on the total expenditures of health and long-term care for the elderly (65+), we examined the following three cases of combination using A or B as health expenditure (Table 1) and D1, D2 or D3 as long-term care expenditure:

Case 1: A + D1;

Case 2: B + D2; and

Case 3: (A + B) / 2 + D3.

Table 2 Expenditure and number of users in the LCI

Year	Expenditure (trillion yen)				Number of users among 65+ (million) ²⁾					
	Total	% of GDP	Benefit ¹⁾	Home	Eligible persons	% ³⁾	Total users	% ³⁾	Home Care	Instit. Care
2000	3.63	0.7	3.24	1.20	2.47	11.0	1.79	8.0	1.19	0.59
2001	4.59	0.9	4.11	1.59	2.88	12.4	2.11	9.1	1.46	0.64
2002	5.19	1.1	4.66	1.97	3.32	13.9	2.46	10.3	1.77	0.69
2003	5.69	1.2	5.10	2.36	3.70	15.1	2.78	11.3	2.06	0.72
2004	6.20	1.2	5.56	2.71	3.94	15.7	3.07	12.2	2.31	0.75
2005	6.40	1.3	5.79	2.94	4.18	16.1	3.26	12.6	2.49	0.77

Note: 1) Benefit Expenditure = Total Expenditure - User charges

2) Numbers of eligible persons and users as of the year-end

3) % = proportion to the population aged 65+

Source: Ministry of Health, Labour and Welfare

Table 3 Long-term care expenditure by age group among elderly population in 2005

Age Group	Population (thousand)	Numbers according to physical condition level (thousand)			LC expenditure (billion yen)	Per capita LC expenditure (thousand yen) E/P	Number of LCI users (thousand) B	B/P (%)
		L1	L2	L3				
65-69	6,411	373	66	10	123.2	19.2	76	1.2
70-74	5,965	856	187	48	412.0	69.1	235	3.9
75-79	5,044	925	376	103	851.5	168.8	479	9.5
80-84	3,637	703	527	181	1,318.2	362.4	708	19.5
85-89	2,301	419	500	233	1,461.5	635.1	733	31.9
90-94	1,189	218	319	256	1,298.0	1,091.2	575	48.3
95+	585	121	159	166	778.5	1,330.7	325	55.5
65+	25,134	3,615	2,132	998	6,242.8	248.4	3,130	12.5

Note: E = (L2 × 0.79 × 140,000 yen + L3 × 0.95 × 300,000 yen) × 12/1000

Source: Author's calculations as explained in text.

Table 4 Number of the elderly (65+) according to physical condition levels

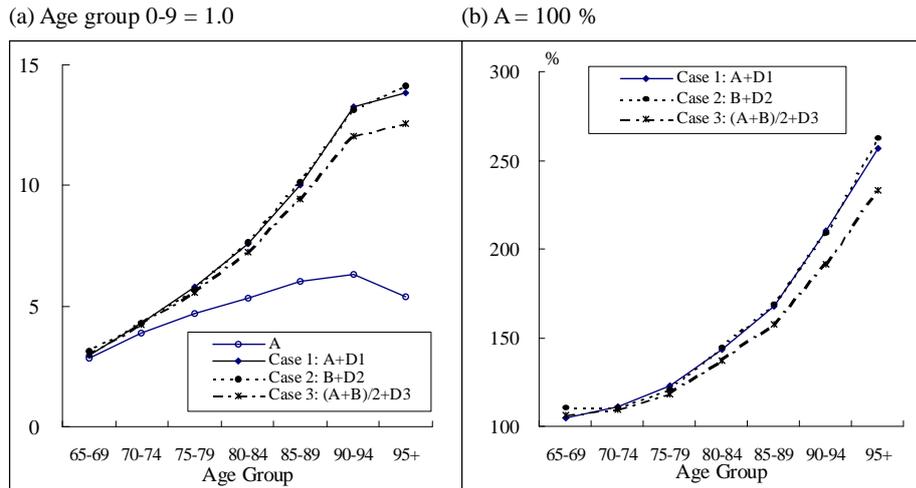
Year	Physical condition level (In thousand)				
	Total	L0	L1	L2	L3
2010	27,459	19,902	3,811	2,588	1,158
2020	36,574	26,471	5,189	3,285	1,629
2030	35,488	23,259	5,807	4,058	2,363
2040	34,924	21,759	5,425	4,606	3,134
2050	39,444	25,851	5,886	4,392	3,315

Source: INAHSIM 2007

Case 1 represents that expenditure structures will continue as they are in 2005, and Case 2 represents that health expenditure of the elderly will be further trimmed on the one hand, and long-term care expenditure will be expanded on the other hand. Case 3 represents that health expenditure of the elderly will be in the middle of A and B, and long-term care expenditure will expand moderately due

to lower prevalence of long-term care needs. Fig. 2 shows (a) per capita expenditure index of health and long-term care relative to per capita health expenditure for age group 0-9 as well as (b) per capita total expenditure (health and long-term care expenditures) relative to health expenditure for each age group, both for all cases in 2005.

Fig. 2 Per capita health and long-term care expenditures index according to age group : 2005

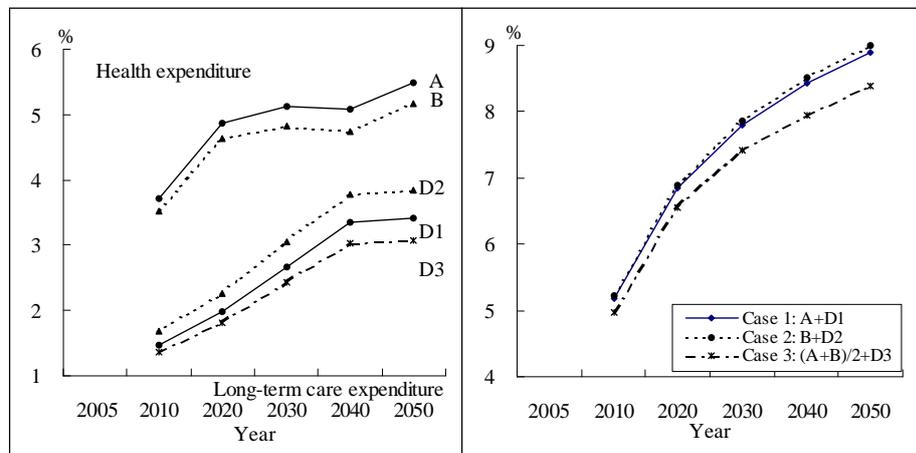


Note D1: $(L2 \times 0.79 \times 140,000 \text{ yen} + L3 \times 0.95 \times 300,000 \text{ yen}) \times 12/1000$
 D2: $(L2 \times 140,000 \text{ yen} + L3 \times 300,000 \text{ yen}) \times 12/1000$
 D3: Based on D2, prevalences of long-term care needs are lower by 20 percent than D2.
 Source: Author's calculations as explained in text.

Fig. 3 shows the result of potential scales of health and long-term care expenditures of the elderly (65+) in Japan for above-mentioned three cases. It is quite clear that there is a strong pressure to increase concerning long-term care expenditure of the elderly, and the total expenditures of health and long-term care for the elderly will increase from

4.7 percent of GDP in 2005 to 8-9 percent of GDP in 2050. It is one thing to control the increase of health expenditure of the elderly. However, it is another thing to control the increase of long-term care expenditure of the elderly, and it is also clear from Fig. 3 that reducing the prevalence of long-term care needs has a significant effect.

Fig. 3 Health and long-term care expenditures of the elderly (65+) as percentage of GDP



Source: Author's calculations.

4. Discussion

Japan is experimenting with various approaches to health reform in order to contain health expenditure and to realize more effective use of health service resources. Policy measures to reform the health system over the past 20 years in Japan have been driven by a concern to control health expenditure, particularly through increasing patient cost sharing. After the reforms in the early 2000s, more fundamental reforms designed to increase the efficiency of health service delivery are required in Japan. Addressing issues related to the elderly is of high relevance for health insurance systems, in order to coordinate health services and welfare services for the elderly and to maintain a fair distribution of the burden of health expenditure for the elderly.

A large part of health expenditure is consumed by the elderly in Japan, and the rate is expected to increase in the future due to aging of the population. Nevertheless, per capita health expenditure has not continued increasing with age, and it has become clear that the relation between population aging and health expenditure should be viewed carefully (Fukawa, 2000). Reduction of the long-term inpatients has been one of the main concerns in the Japanese healthcare reforms, and the spending pattern of per capita health expenditure by age group has already changed drastically between 1999 and 2004. In comparison with Germany, however, it might be possible to say that Japan can reduce inpatient care of the elderly further without deteriorating health outcomes of the elderly (Fukawa, 2007a). Health expenditure of the elderly will increase in the future as shown in Fig. 3, but certainly not so rapidly as long-term care expenditure. Nakanishi and Nakayama (2001) analyzed the effects of demographic change on health expenditure in Japan by developing a simulation model, and suggested that under the present health care system health expenditure will reach 11 percent of GDP by 2015. Spending on health in most European countries, on the other hand, has risen from 7.8 percent of GDP in 1997 to 8.5 percent in 2002 on average, and more than 60 percent of the increase is due to technological improvements (Pestieau, 2006).

The cost of long-term care for the elderly is around 1 percent of GDP in many countries, although it is quite high in Nordic welfare states (OECD, 1999). It will increase remarkably in many countries in 2050 (between 2 and 3 percent), but the projected increment will differ by about 1 percent point of GDP according to health status of the elderly in future and effectiveness of preventive measures (OECD, 2006). According to the result

shown in Fig. 3, Japanese long-term care expenditure would rise between 3 to 4 percent of GDP in 2050. In our estimation, dynamic interaction between healthcare and long-term care of the elderly is not taken into account. However, if Japanese long-term care expenditure of the elderly will pass over 3 percent of GDP in 2050, a present level in Sweden, even if the conversion of surplus hospital beds to long-term care beds had proceeded well, then the message is rather clear concerning the sustainability of the system. It is important to reduce the number of dependent elderly in future through better prevention, and it might be necessary to introduce cost containment mechanisms in the Japanese long-term care insurance, in view of the fact that long-term care expenditure is more sensitive to population aging than health expenditure as shown in Fig. 2.

Under the rapid aging of the population as well as decline in the total population, the question of how to finance the cost of public programs for still growing elderly population has been a leading issue in recent years in Japan. How to control the health and long-term care expenditures of the elderly and how to finance them will continue to be lasting issues on the one hand, while society should bear the cost of retirement benefits for the elderly on the other hand. The social cost of the elderly, social security benefits as percentage of GDP committed to those who are aged 65+, was higher in Germany than it was in Japan: about 11.5 percent of GDP was devoted to pension, health and long-term care of the elderly in Japan compared to 14.2 percent in Germany (Note 9). Even if Japanese pension benefits will remain at 10 percent of GDP through further efforts, the social cost of the elderly in Japan will become almost the same as that in Germany.

The health sector has been the focus of much policy reform effort over the past two decades, to coincide with shifting ideas worldwide about the welfare state and the role of the public and private sectors in health care financing and provision (Lee, Fustukian and Buse, 2002). Besides improving the fairness and efficiency of the system, it is important in the fields of health care and long-term care for the elderly 1) to emphasize prevention, 2) to put the right incentives in the system, and 3) to give choice to the service users. Reducing the role of public system and shifting the fund from contributions to taxes change the distribution of burden, but do not change the total burden of the nation. The only ways to reduce the total burden are to reduce the number of service users and to deliver services efficiently. Which means a) prevention is important, b) service providers and

service users should face the right incentives, and c) services should be provided under competitive circumstances, for both health services and long-term care services.

Japanese health insurance in general used to pay relatively little attention to preventive care up until now, and many preventive measures such as health check and cancer screening are conducted outside health insurance. However, in view of the importance of lifestyle-related diseases, prevention has slowly become one of the main issues in 2006 healthcare reform. Prevention is important not only for averting cost-push pressures to health expenditure but also for people's quality of life (Fukawa, 2007a). Concerning long-term care of the elderly, the only positive way to contain the expansion of the expenditure is to prevent the elderly from becoming dependent.

Many elderly people with chronic conditions need more care services than health services. It is more reasonable for the elderly themselves to decide which services they use, if they have enough knowledge and information about these services. It is a common challenge for developed countries to make social security systems neutral to the choice of individuals in their lifestyle in order to increase responsiveness of the system and to improve the quality and efficiency of services provided.

Japan faces very rapid ageing of the population and the Japanese social security system is dominated by a social insurance system based on social solidarity. People's preference for equality used to be strong, especially in healthcare services in Japan, and some Japanese systems such as the Basic Pension and special healthcare program for the elderly are quite unique based on culture and customs in Japan. However, the ageing process is progressing rapidly and the features of solidarity are changing. The welfare system needs to be more effective, sustainable and user-friendly through structural reforms and a paradigm change. Financing of the welfare state is still one of the key issues in Japan, and new approaches are reviewed including new perception of the elderly, broadening the financing basis of social benefits, and a desirable mix of public programs and private arrangements. If we define the elderly population as the oldest 20 percent of the population based on the stable population in the Life Tables, then the threshold age for the elderly was 59 years old in 1960, 67.5 in 2005, and will be 71 years old in 2050 (Fukawa, 2007c)

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Notes

(Note 1) One third of the elderly aged 65 or over live alone in many developed countries. In Japan, however, the co-residence rate of the elderly with the child generation is high, and the rate increases with age.

(Note 2) Membership in the Program was for those who were aged 70 and over as well as disabled persons aged 65-69. These persons might be in any fund, although they were most likely to be in National Health Insurance. Patient cost-sharing aside, 70 percent of the total cost was covered by all sickness funds, 20 percent by the national government, and 10 percent by local governments.

(Note 3) In OECD Health Data, the following items are contained: a) hospital services, b) ambulatory care, c) pharmaceuticals and medical goods, d) public health, e) nursing and residential care, and f) administration & others.

(Note 4) The breakdown of health expenditure for people 85 years old or over into three parts, namely 85-89, 90-94 and 95+, is not published and is assumed by the author.

(Note 5) Although the degree of the socially-induced hospitalization is not measured, the assumption implies that half of them are eliminated from the healthcare system between 1999 and 2004.

(Note 6) In the Japanese LCI, facility-based services are limited to skilled nursing facilities, health service facilities for the elderly and skilled nursing wings of geriatric hospitals. Those elderly staying at the other facilities are classified as receiving home care services. Beneficiaries in this category are increasing rapidly.

(Note 7) Fiscal year starts at 1 March and ends at 28 February for the LCI. Because the system implemented at 1 April 2000, the year 2000 had only 11 months.

(Note 8) Because of user charges and others, some beneficiaries may not use long-term care services in full or refrain from using services at all during certain month(s) within a year. The first factor is reflected in the average amount of care cost, but the second factor is not. In order to take the second factor into consideration in estimating LC expenditure, we used the take-up rate in this paper.

(Note 9) Social security benefits for the elderly aged 65+ as percentage of GDP in 2003 were as follows (OECD, 2007): pension 7.6, health 3.1, long-term care 0.8 in Japan; pension 10.1, health 2.8, long-term care 1.3 in Germany.

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