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Health expenditure of deceased elderly in Japan

Tetsuo Fukawa

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National Institute of Population
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Social Security Research

1-2-3 Kasumigaseki, Chiyoda-ku,
Tokyo, Japan

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1. Introduction

Health insurance for the elderly was introduced in 1983 to equalize the burden of health costs of the elderly among various sickness funds and introduced cost sharing of elderly patient. Those who are aged 70 or over and disabled elderly aged 65-69 are eligible to this program. Under this program, patient cost-sharing is 1,020 yen per month for outpatient care and 710 yen per day for inpatient care. Patient cost-sharing aside, 70 percent of the total cost is paid by all sickness funds, 20 percent by the national government, and 10 percent by local governments. In consideration of the importance of long-term care for the elderly, the proportion borne through public fund has been raised in 1992 from 30 percent to 50 percent if the expense is related to long-term care services for the elderly.

Because of the existence of health insurance for the elderly, health expenditure of the elderly in Japan refers to health expenditure of those who are eligible to this program. About 30 percent of national health expenditure was consumed through this program, although the share of health expenditure for those who are aged 65+ was 43 percent. The followings are among the characteristics of health expenditure of Japanese elderly : a) About 64 percent of the cost is financed by all the sickness funds, and this transfer system makes many sickness funds financially unstable ; b) Consumption of pharmaceuticals is quite high in health care of the elderly, especially high for outpatient care (about half of elderly outpatient expenditure goes to pharmaceuticals) ; c) The percentage of long stay in hospitals is quite high, and especially serious is the existence of unnecessary hospitalization among those elderly who no longer need any health services (this is called socially induced hospitalization in Japan).

Health care reform is a big issue in these days in Japan as well as in many other OECD countries. The fee schedule and the drug standard have been the main tools to pursue health care reforms in Japan. It has become clear, however, that these tools are limited, and other measures are searched to improve the quality and efficiency of health services concurrently. Classification of hospitals according to their functions and streamlining patient flow are among those options which are seriously considered. Prospective payment has already been partially introduced in health care for the elderly, in order to reduce negative effects of fee for service system. More emphasis has been put on quality aspect in health care reforms in 1990s. Because of the cap, patient cost sharing is low : about 15 percent on average for non-elderly and 5 percent for elderly. Therefore, cost sharing is so far not a major problem in Japan. However, one of

the major factors of recent health reform is the increase in cost sharing (Note 1).

Health expenditure of deceased elderly is generally considered as one of major causes to increase health expenditure of the elderly. This paper is to analyze health expenditure of deceased elderly and its implication to population aging.

2. Data and Method

The data set we used was a large scale micro data on health expenditure of the elderly, which were based on medical fee claim records. The data set covered one year from March 1992 to February 1993. The data set was complied from monthly claim units (Note 2) of 1.3 million individuals, containing the following items : age, sex, municipality code, participating public insurance, monthly records of a) number of claim units, b) number of treatment days, and c) health expenditure, for inpatient care and outpatient care respectively. The data was collected from 11 prefectures, and 63 thousand deceased elderly were included in the data set. Dental care was not included in the data set.

Health expenditure of deceased elderly was observed through monthly health expenditure per deceased elderly, not per patient. Each calendar month was regrouped according to the distance to the death : [0]=0 to 30 days before death, [-1]=30 to 60 days before death, [-2]=60 to 90 days before death, and [-6]=180 to 210 days before death. We did a modification for the month of death ([0]), because a death occurs in the middle of a calendar month on average, causing 0 to 15 days coverage for the month of death without modification (Note 3).

3. Results

It is estimated in Japan that among annual health expenditure of the elderly (70+ and severely disabled 65-69), the amount used for the deceased during the year was 11 to 12 percent. The percentage was higher for males (15 percent) than females (9 percent), and the percentage increased with age from 8 percent for age group 70-74 to 30 percent for age group 95+,   reflecting the increase in mortality with age. If we focus on inpatient care alone, the percentage was much higher : 18 percent for age-sex total. Among survived elderly, the percentage of inpatient expenditure increased from 46 percent for age group 70-74 to 71 percent for age group 95+. However, the percentage of inpatient expenditure was quite high among deceased elderly, and it decreased with age from 90 percent for age group 70-74 to 82 percent for age group 95+.

3.1 Monthly health expenditure per deceased elderly for 12 months prior to death

Table 2 and Fig. 2 show monthly health expenditure per deceased elderly by age group for 12 months prior to death. Average monthly expenditure increased gradually until 3 months before death, but increased rapidly afterwards. It was the case for each age group. Average health expenditure per deceased elderly for each month relative to that of 6 months prior to death ([-6]=1.0) for age total is as follows : [-2]=1.7, [-1]=2.2, [0](month of death) = 3.4.   As shown in Fig. 2, health expenditure per deceased elderly decreased with age increase, and this is the case for each month. Therefore, annual health expenditure per deceased elderly decreased rapidly with age, although it was much higher than annual health expenditure per survived elderly as shown in Fig.3 (7 times for age group 70-74, 2 times for age group 95+, and 4.3 times for age total). Male health expenditure per deceased elderly was always higher than that of female of the same age group for each month in 12 months prior to death. The distribution of annual health expenditure per deceased elderly among 12 months prior to death did not differ much by age group or sex as shown in Table 2, and the percentage of the final month (30 days) was 21 percent. Fig.2 was based on the period data, but the same pattern was found from both those elderly who died in February 1993 and cohort data of 5 prefectures (Fig.4).

The percentage share of inpatient expenditure in health expenditure per deceased elderly was dominant as mentioned before. Accordingly, main factors which caused increase in monthly health expenditure per deceased elderly as final month approaches were a) utilization of inpatient care and b) per day expenditure of inpatient care. Fig.5 shows trends of these indices relative to the level of [-11]=1.0. This figure suggests that utilization of inpatient care is the important factor to influence health expenditure of the elderly prior to death.

In sum, health expenditure per deceased elderly for 12 months prior to death was mainly determined by the utilization of inpatient care, and it was found good enough to focus on 6 months, instead of 12 months, prior to death.

3.2 Utilization of inpatient care and health expenditure per deceased elderly in 6 months prior to death.

Table 2 and Fig. 2 show an average picture of deceased elderly, but they themselves were diversified in terms of health care utilization. Now, we classify deceased elderly into 4 categories according to the   utilization of inpatient care in 6 months prior to death. Table 3 shows the result of classification. Those deceased elderly who used no inpatient care in 6 months prior to death were referred to category a. Those who used inpatient care in the final month only were classified as b1, those who used inpatient

care in final two months as b2, and those who used inpatient care in final 5 months as b5. Category b is the sum of b1, b2, b3, b4 and b5. Those who used inpatient care in all 6 months were referred to category c, and the rest were classified as category d. The percentage of category a was below 20 percent for age group 70-79, but increased to around 50 percent for age group 95+. It is to say that about half of deceased elderly aged 95+ never used inpatient care in 6 months prior to death. On the other hand, the percentage of category c decreased gradually with age : from 26 percent for age group 70-74 to 16 percent for age group 95+. Table 3 shows in general that utilization of inpatient care decreased with age, which of course contributed to the decrease of health expenditure per decreased elderly with age.

Fig. 6 shows monthly health expenditure per deceased elderly by category for 6 months prior to death. For category a, health expenditure per deceased elderly was quite low, and no significant increase was observed as the final month approached. On the other hand, health expenditure per decreased elderly was high for category c, and rather rapid increase was observed in the final 2 months, although per day inpatient expenditure was the lowest for this category. A sharp increase in terminal care period was the characteristics of category b, as anticipated by the definition. For both categories b and c, health expenditure per deceased elderly decreased with age and male average was always higher than female average of the same age group. Within the same category, per day inpatient expenditure increased as the final month approached, and among the different categories, it increased as hospitalization delayed. Table 4 shows per day inpatient expenditure in the final month by age group, sex and category. There was a large difference among categories, and per day inpatient expenditure was particularly high for category b1. Within the same category, per day inpatient expenditure decreased with age in general.

Our next focus is the classification of deceased elderly according to the utilization of inpatient care in the final 3 months. Deceased elderly were classified into 5 categories : a) used no inpatient care in 3 months prior to death ; b) used inpatient care in the final month only ; c) used it in the final 2 months ; d) used inpatient care in all 3 months prior to death ; and the others were classified as category e. Table 5 shows the result of classification. The percentage of category a increased with age, and the percentages of categories b, c and d decreased with age. The distribution of total deceased elderly among categories was 27 percent for category a, 26 percent for categories b and c, and 43 percent for category d, but about half of deceased elderly aged 70-79 were classified in category d on one hand, category a was dominant for elderly aged 90+ on the other hand. Category e was negligible.

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Further, we classified category d into 4 groups d1-d4, according to the level of inpatient expenditure per day in the final month (EPDf), in order to investigate the degree of increase in health expenditure at terminal care period. Here we did not make any adjustment on the number of inpatient days in the final month. Table 6 shows the result of classification by age group and sex. Among those 230 thousand deceased elderly who used inpatient care in final 3 months consecutively, the proportion of high EDPf of 40 thousand yen or more was 23 percent for male and 16 percent for female. This proportion decreased with age : from one quarter for age group 70-74 to 7 or 8 percent for age group 95+. Inpatient expenditure per day for 12 months prior to death is shown in Fig.7 for each group of d1-d4. Several points can be made from Fig.7. Those who belonged to higher cost group in the final month also belonged to higher cost group in each month of 12 months prior to death. Inpatient expenditure per day remained almost stable as final month approached for about two thirds of those elderly who used inpatient care in final 3 months consecutively, and steep increase in inpatient care cost occurred to only one fifth of such elderly in final 3 months.

4. Discussion

Health expenditure of deceased elderly is one of the important issues in relation to population aging. The following points were revealed by analyzing the health expenditure of deceased elderly in final twelve, six, and three months.

- Average monthly expenditure for each age group increased gradually until 3 months before death, but increased rapidly afterwards.
- Health expenditure per deceased elderly decreased with age for each month prior to death. Consequently, annual health expenditure per deceased elderly decreased rapidly with age.
- Health expenditure per deceased elderly for 12 months prior to death was mainly determined by the utilization of inpatient care.
- The percentage of those deceased elderly who used no inpatient care in 6 months prior to death was below 20 percent for age group 70-79, but increased to around 50 percent for age group 95+. Utilization of inpatient care decreased with age, in general.
- There was a large difference in per-day inpatient expenditure among different categories on utilization of inpatient care. Per-day inpatient expenditure was highest for those deceased elderly who used inpatient care only in the final month during the final 6 months, and lowest for those who used inpatient care in all the 6 months.

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- A steep increase in health expenditure at terminal care period occurred to only 8 percent of deceased elderly. Moreover, such increase occurred only in the final 2, 3 months.

It was reported in the US that the amount of health expenditure allocated to the deceased at age 65 or over during the final 12 months before death corresponded to 28 percent of annual Medicare expenditure, and that 30 percent of all health expenditure in the last year of life was spent in the last 30 days (Lubitz and Prihoda, 1984). Lubitz and Riley (1993) confirmed similar results by using 1988 data. Five percent of decedents who died in 1988 accounted for 27 percent of total Medicare payments of that year, and about 40 percent of all Medicare costs in the last year of life were incurred in the last 30 days of life.

In 1992, the number of the deceased at age 70 or over was 559 thousand in Japan. If we use 2.7 million yens as an average annual health expenditure per deceased elderly, it can be said that the amount of health expenditure allocated to the deceased at age 70 or over during the final 12 months before death corresponds to 22 percent of annual health expenditure of the elderly in Japan. It is also derived from Table 2 that of all health expenditure for the deceased elderly in the last year of life, 21 percent was spent on average in the last 30 days, compared to 30 percent in the US.

The proportion of health expenditure allocated to the deceased was larger in the US, and therefore terminal care cost was more expensive in the US than in Japan. Although, even in the US, it is not considered that saving at terminal care period will not contribute much for the saving of total health expenditure, the differences in health expenditure for the deceased elderly between the two countries will explain, at least to some extent, the differences in national health expenditure. It may be more suitable to deal with the issue of terminal care expenditure from the point of view of equitable and efficient distribution of health resources among age groups and between survivors and deceased.

Japanese health expenditure as percentage of GDP is still low compared to the US or most European countries, but an annual increase of 1 trillion yen has not a little impact on Japanese economy and social system. Therefore, the quality and efficiency of the health expenditure of the elderly will continue to be a central issue. The issue of long-term care for the elderly has become a high priority policy agenda recently, and the health expenditure of the elderly will also be reviewed in connection with the introduction of long-term care insurance. Japanese 0.7 million bed-ridden elderly correspond to 4.6 percent of the total elderly population aged 65+, and about 60 percent of them are institutionalized. Many of bed-ridden elderly in Japan are considered to be

socially induced because of shortage of care manpower, lack of facilities, housing problems, and so on. Viewing the elderly aged 65+ as a whole, however, Japanese elderly seem to be enjoying more healthier life than the US elderly in terms of morbidity and ADL limitation, if we ignore many difficulties involved in the comparison.

Note 1. Under the reform bill, which has passed in June 1997, patient cost-sharing as percentage of total expenditure concerned is explained to increase as follows :

Elderly	outpatient care	: 4. 4 percent	→ 11 percent
	inpatient care	: 6 percent	→ 7. 5 percent
	total	: 5. 5 percent	→ 9 percent
Non-elderly	total	: 17 percent	→ 23 percent

Note 2. Each month, medical facilities submit medical fee claims to medical fee payment organizations in Japan, attaching detailed records called claim units or "reseputo" in Japanese, which describe the particulars of medical services provided to each patient during pertained one month.

Note 3. Let i as each month prior to death (i = 0, -1, -2, $\cdots\cdots$), and let ai and bi as health expenditure per deceased elderly before modification and after modification respectively, for example, bi is defined as follows :

$$b_i = (a_i + a_{i-1})/2 \qquad i = -1, -2, \cdots$$
$$b_0 = a_0 + a_{-1}/2$$

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Table 1 Per capita health expenditure by age group and sex : 1992

age group	per capita health expenditure (in thousand yen)						survived					
	survived			survived+deceased			patient rate (%)		expenditure (1,000yen)			
									per patient		per day	
	m & f	male	female	m & f	male	female	male	female	male	female	male	female
total												
total	547	560	538	588	618	566	90.3	92.1	620	585	10.1	8.8
70-74	463	494	440	491	536	457	89.8	92.0	550	478	10.0	8.4
75-79	540	556	529	579	612	555	90.7	92.8	613	570	10.0	8.7
80-84	604	595	609	653	667	643	90.8	92.4	656	660	10.0	9.0
85-89	635	598	654	688	681	692	89.3	90.7	670	722	10.0	9.2
90-94	617	562	639	662	642	670	86.9	87.8	647	727	9.7	9.2
95+	571	535	583	611	611	611	81.8	84.9	654	686	9.5	9.1
inpatient												
total	292	295	289	340	360	325	23.2	21.0	1272	1376	17.1	13.8
70-74	215	243	194	247	289	215	20.1	16.4	1212	1178	18.9	16.0
75-79	275	285	268	320	348	300	23.3	21.0	1224	1274	17.7	14.3
80-84	350	330	363	409	413	406	26.0	24.9	1269	1455	16.0	13.0
85-89	413	361	439	477	458	487	27.1	26.8	1333	1635	14.7	12.2
90-94	432	366	457	487	460	499	25.8	25.6	1420	1784	13.3	11.8
95+	405	359	420	455	450	457	23.5	23.4	1524	1798	12.6	11.8
outpatient												
total	256	265	249	248	258	241	88.8	89.8	299	277	7.0	6.2
70-74	248	251	246	244	247	242	88.9	91.1	282	271	6.9	6.1
75-79	266	271	262	259	264	255	89.5	91.1	303	287	6.9	6.2
80-84	254	265	247	244	254	237	88.9	89.1	298	277	6.8	6.2
85-89	222	237	215	211	223	205	86.6	85.6	273	251	6.7	6.1
90-94	186	196	182	174	182	171	82.9	81.0	236	224	6.5	6.0
95+	166	176	162	156	162	155	76.9	78.2	229	208	6.4	5.7

Fig. 1 Per capita health expenditure by age group and sex

(a)Per capita health expenditure
    (inpatient plus outpatient)
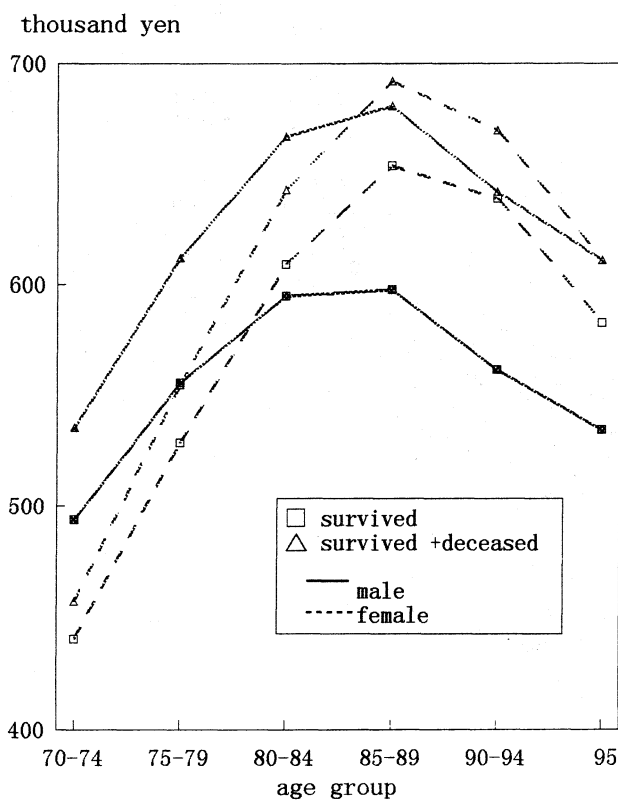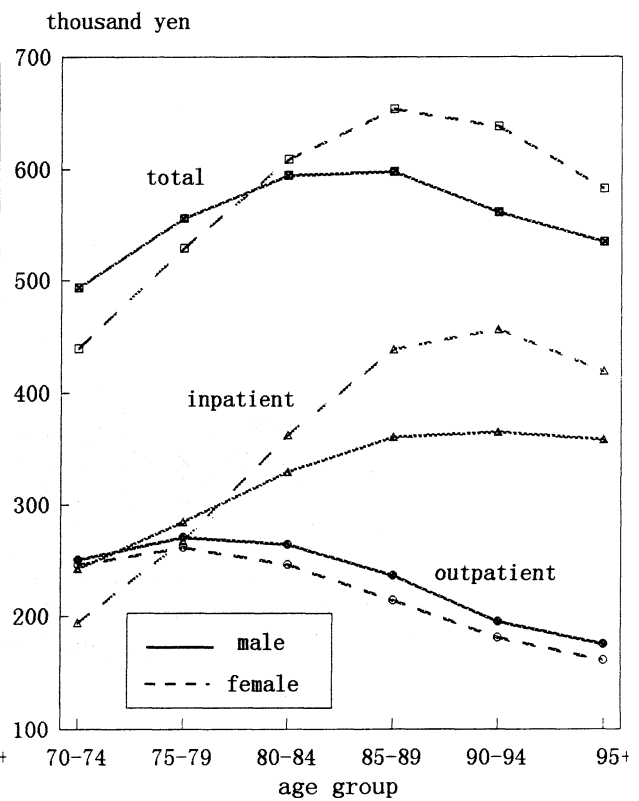
(b)Per capita health expenditure (survived)

Table 2 Monthly health expenditure per deceased elderly for 12 months prior to death : 1992

(in thousand yen)

| age group | 12 months prior to death | | | | | | | | | | | | total |
	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	
70-74	147	152	160	166	176	190	211	235	268	326	442	700	3173
75-79	131	130	130	137	149	166	183	204	235	282	378	586	2710
80-84	102	106	114	121	130	140	154	176	202	240	318	479	2282
85-89	88	93	100	103	108	117	128	143	163	195	254	384	1876
90-94	68	71	77	80	84	92	100	109	126	150	197	299	1452
95+	48	54	61	66	75	84	86	89	100	122	163	245	1193
total	110	113	119	125	133	145	159	178	204	244	325	498	2354

(in percent)

age group	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	total
70-74	4.6	4.8	5.0	5.2	5.5	6.0	6.6	7.4	8.4	10.3	13.9	22.1	100.0
75-79	4.8	4.8	4.8	5.1	5.5	6.1	6.8	7.5	8.7	10.4	13.9	21.6	100.0
80-84	4.5	4.6	5.0	5.3	5.7	6.1	6.7	7.7	8.9	10.5	13.9	21.0	100.0
85-89	4.7	5.0	5.3	5.5	5.8	6.2	6.8	7.6	8.7	10.4	13.5	20.5	100.0
90-94	4.7	4.9	5.3	5.5	5.8	6.3	6.9	7.5	8.7	10.3	13.6	20.6	100.0
95+	4.0	4.5	5.1	5.5	6.3	7.0	7.2	7.5	8.4	10.2	13.7	20.5	100.0
total	4.7	4.8	5.1	5.3	5.6	6.2	6.8	7.6	8.7	10.4	13.8	21.2	100.0

Fig. 2 Monthly health expenditure per deceased elderly for 12 months prior to death : 1992
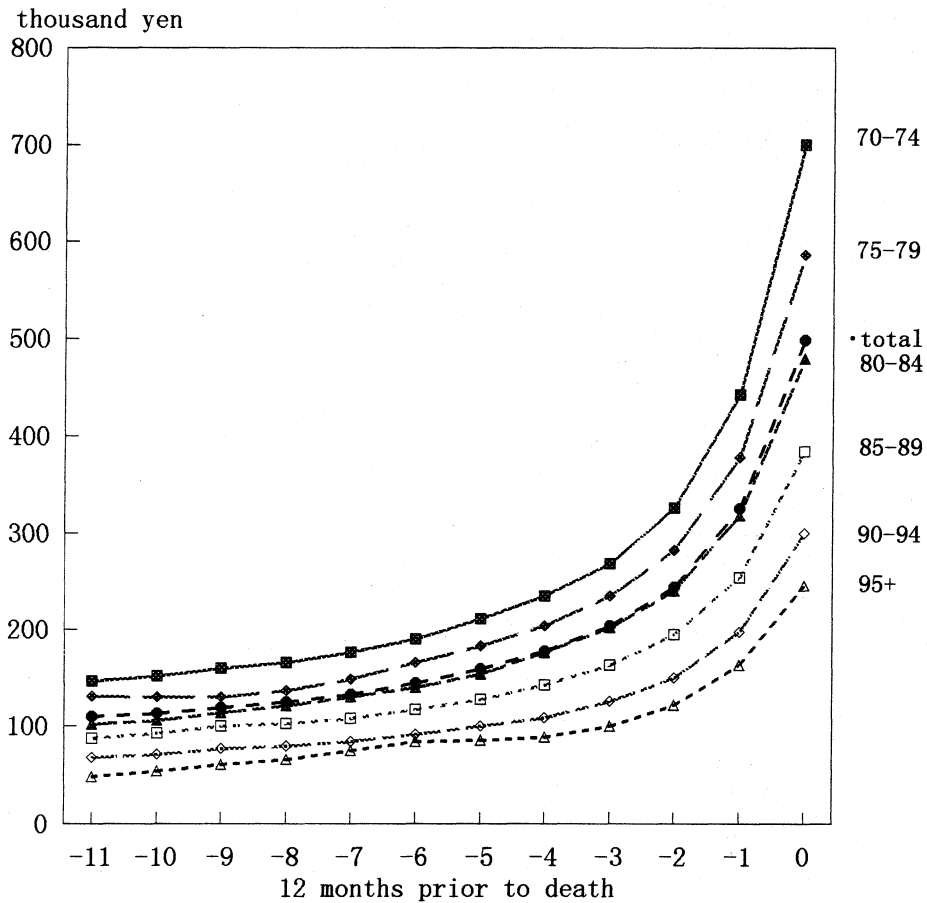
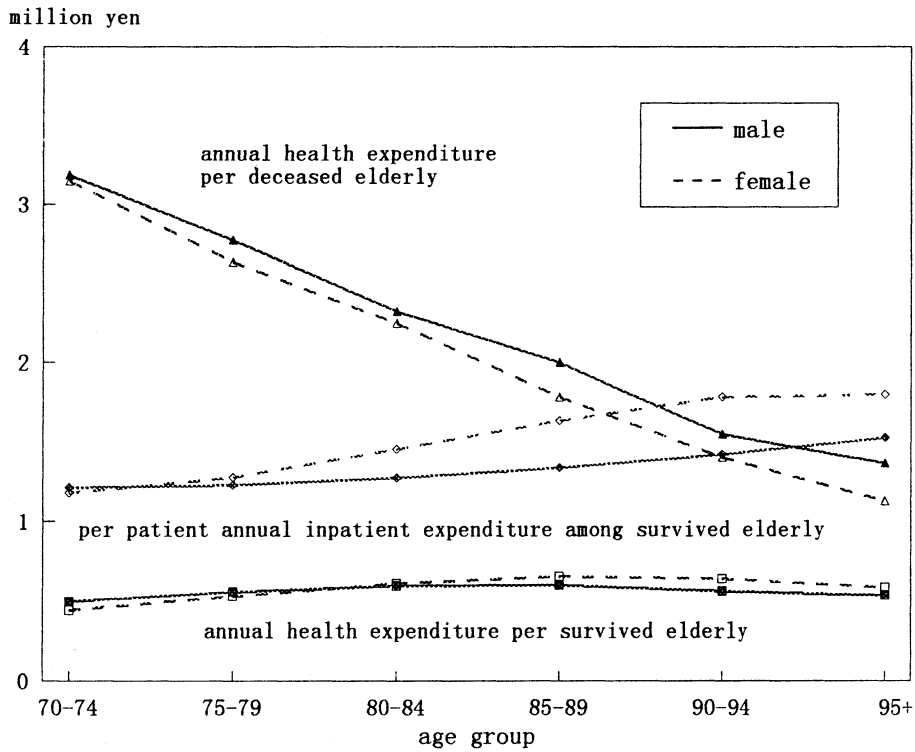Fig. 3 Per capita annual health expenditure for survived and deceased

million yen

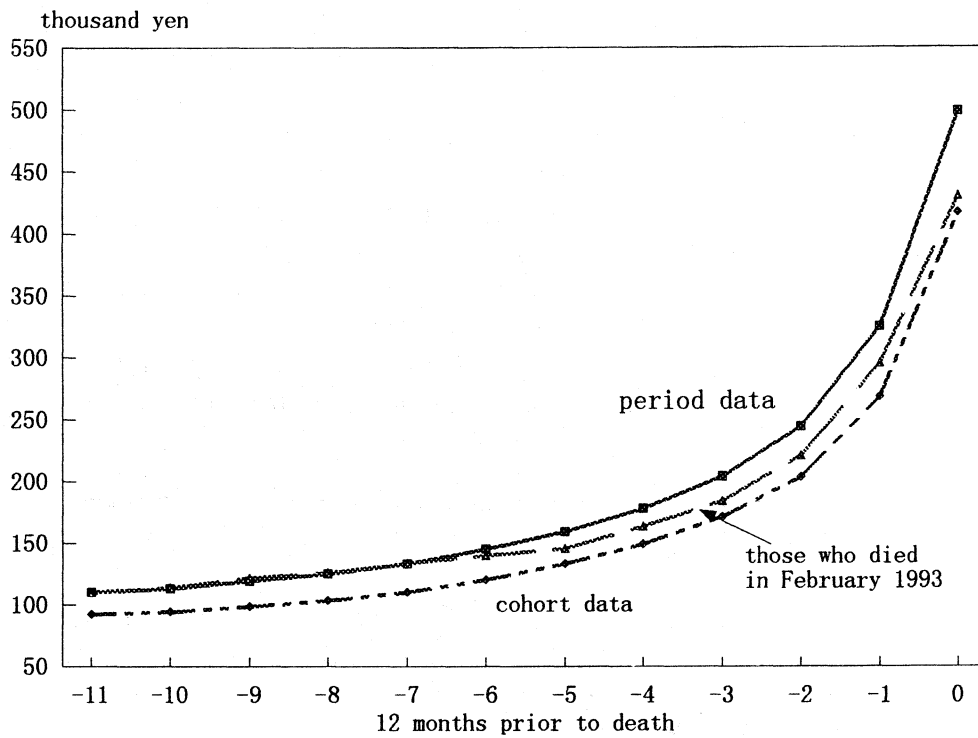Fig. 4 Monthly health expenditure per deceased elderly among
different data sources

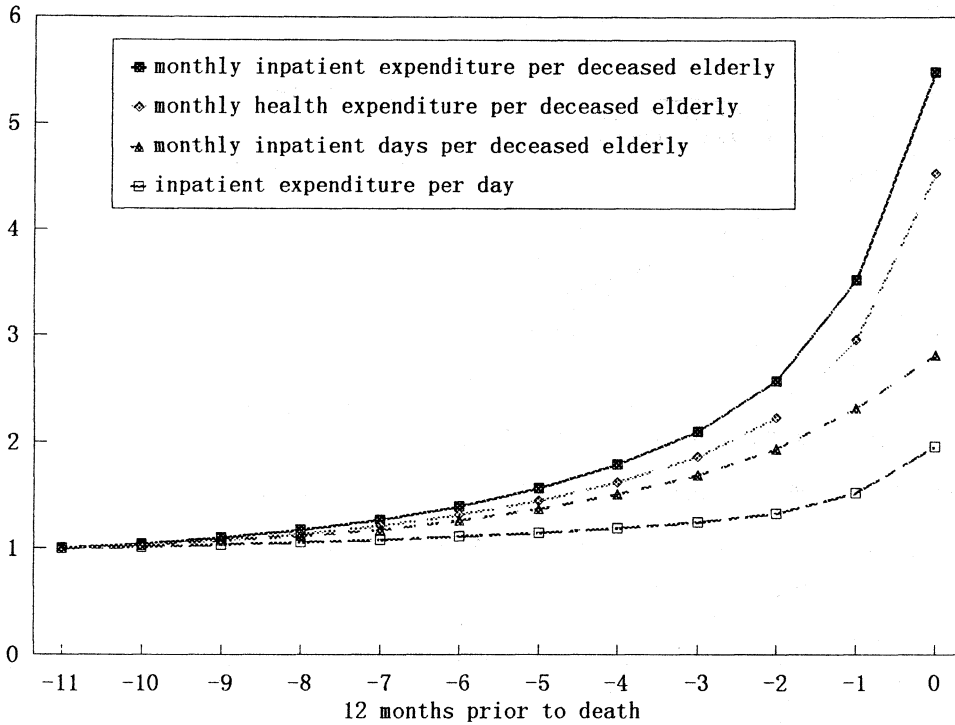## Fig 5 Trends of indices in 12 months prior to death (-11=1.0)

Legend:
- ⊕ monthly inpatient expenditure per deceased elderly
- ◇ monthly health expenditure per deceased elderly
- ▲ monthly inpatient days per deceased elderly
- ⊟ inpatient expenditure per day

x-axis: -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0
12 months prior to death

Table 3. Classification of deceased elderly by utilization of inpatient care in 6 months prior to death

age group	both sexes					male					female				
	number	distribution by category (%)				number	distribution by category (%)				number	distribution by category (%)			
		a	b	c	d		a	b	c	d		a	b	c	d
70−74	5,999	14.5	43.5	26.3	15.6	3,637	13.7	44.8	24.6	16.9	2,362	15.8	41.4	29.0	13.7
75−79	8,666	16.9	43.2	25.3	14.6	4,969	15.9	44.5	23.1	16.5	3,697	18.2	41.4	28.3	12.1
80−84	9,779	23.8	38.4	25.1	12.7	5,049	21.3	42.2	22.5	14.0	4,730	26.4	34.4	27.9	11.4
85−89	7,703	33.2	33.7	21.9	11.2	3,289	28.8	38.7	19.9	12.7	4,414	36.5	30.0	23.4	10.1
90-94	4,136	45.0	27.2	18.4	9.3	1,421	40.0	31.1	17.7	11.3	2,715	47.7	25.2	18.9	8.3
95+	1,145	52.4	24.6	16.3	6.6	321	46.7	29.0	17.1	7.2	824	54.6	22.9	16.0	6.4
total	38,241	25.5	37.7	24.1	12.7	19,246	21.3	41.6	22.6	14.6	18,995	29.9	33.7	25.5	10.9

Note : Definition of each category is shown below.   b = Σ b i,   d is the others.

category	6 months prior to death					
	-5	-4	-3	-2	-1	0
a	○	○	○	○	○	○
b 1	○	○	○	○	○	●
b 2	○	○	○	○	●	●
b 3	○	○	○	●	●	●
b 4	○	○	●	●	●	●
b 5	○	●	●	●	●	●
c	●	●	●	●	●	●

(● means utilization of inpatient care,
○ means no utilization of inpatient care)

Table 4. Inpatient expenditure per day in the final month by age group,
　　　　 sex and category

(in thousand yen)

age group	male						female					
	b1	b2	b3	b4	b5	c	b1	b2	b3	b4	b5	c
70-74	74.9	46.1	44.8	37.0	38.2	34.5	68.7	47.3	40.6	36.6	35.7	30.6
75-79	57.3	39.0	40.9	36.6	31.7	29.2	55.0	38.0	33.6	28.3	29.8	25.4
80-84	43.7	35.1	33.5	29.3	26.6	25.8	45.5	30.5	28.8	29.7	25.2	22.7
85-89	38.8	32.5	30.5	31.1	29.3	23.6	43.2	29.9	28.0	27.4	24.4	21.3
90-94	35.6	29.0	26.1	25.5	24.0	21.1	36.6	28.5	23.7	24.5	23.6	20.4
95+	32.8	25.8	29.6	14.9	21.3	18.5	31.2	22.8	22.0	21.1	23.5	17.5
total	52.5	37.7	37.2	33.8	32.4	28.1	49.4	34.2	31.0	29.6	28.2	23.9

Table 5. Classification of deceased elderly by utilization of inpatient care
　　　　 in 3 months prior to death

age group	both sexes					male					female				
	number	distribution by category (%)				number	distribution by category (%)				number	distribution by category (%)			
		a	b	c	d		a	b	c	d		a	b	c	d
70-74	8,381	15.7	15.0	15.5	50.1	5,085	15.1	14.9	16.5	49.4	3,296	16.7	15.1	13.8	51.2
75-79	12,146	18.6	14.3	15.2	47.6	7,042	17.8	14.5	16.3	46.7	5,104	19.7	14.0	13.6	48.8
80-84	13,743	25.1	13.3	13.3	44.3	7,079	22.8	13.6	15.2	43.9	6,664	27.6	12.9	11.3	44.7
85-89	10,684	34.7	11.8	11.7	37.2	4,549	30.3	12.2	13.6	38.2	6,135	37.9	11.5	10.3	36.4
90-94	5,829	44.6	10.0	9.8	29.9	1,994	42.2	10.9	10.3	31.3	3,835	48.8	9.4	9.5	29.2
95+	1,615	53.1	9.0	9.0	26.0	451	46.6	9.3	11.3	29.5	1,164	55.7	8.8	8.1	24.7
合　計	53,522	27.0	13.0	13.2	42.8	26,971	22.8	13.6	14.9	44.0	26,551	31.2	12.3	11.4	41.5

Note : Definition of each category is shown below.　　　　b =Σ b i,　d is the others.

category	3 months prior to death		
	-2	-1	0
a	○	○	○
b	○	○	●
c	○	●	●
d	●	●	●

(● means utilization of inpatient care,
○ means no utilization of inpatient care)

Fig. 6 Monthly health expenditure per deceased elderly according to
the category in 6 months prior to death

(a) total of age and sex

(c) category c
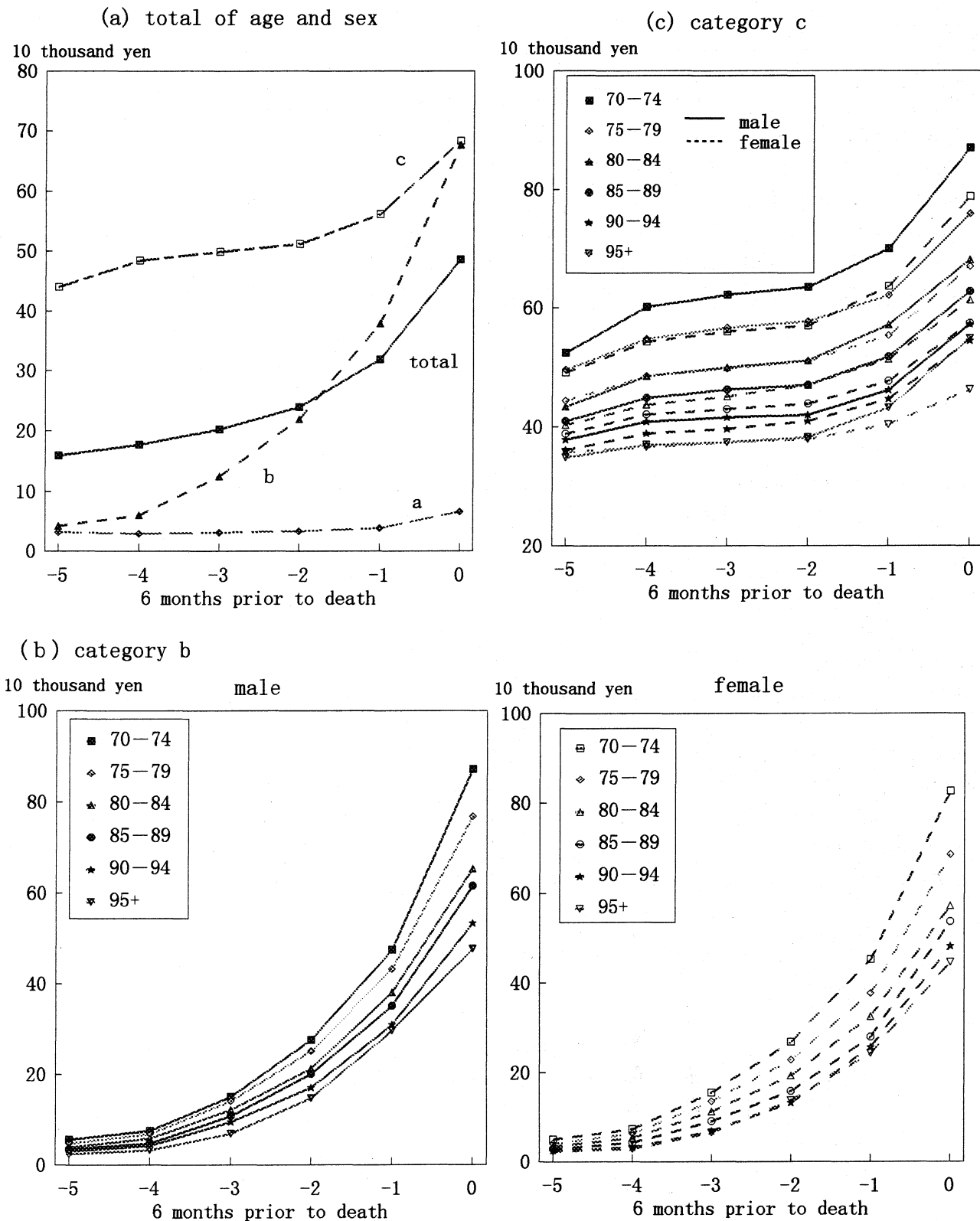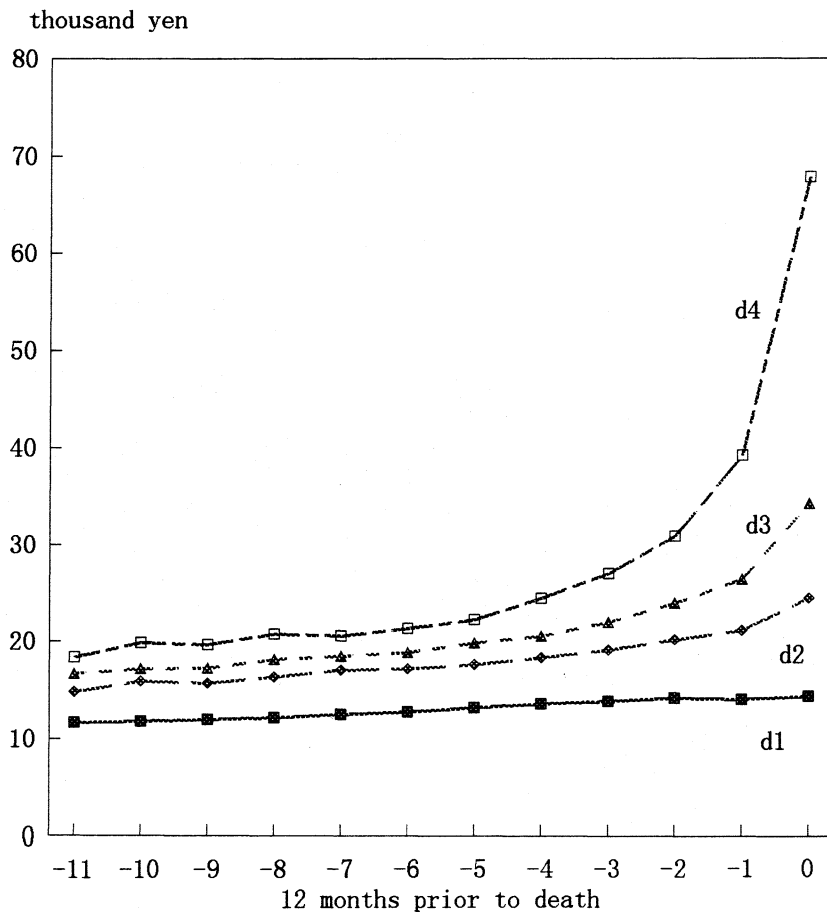

(b) category b

Table 6. Classification of those deceased elderly who used inpatient care in
         final 3 months consecutively according to inpatient expenditure
         per day in the final month

(in percent)

age group	number	male				number	female			
		d1	d2	d3	d4		d1	d2	d3	d4
		per day expenditure (thousand yen)					per day expenditure (thousand yen)			
		-20	20-30	30-40	40-		-20	20-30	30-40	40-
70—74	2,512	27.2	27.3	17.6	27.9	1,687	30.1	29.5	15.7	24.8
75—79	3,289	31.4	27.7	16.6	24.2	2,492	40.8	27.5	14.0	17.7
80—84	3,109	38.1	27.7	14.1	20.1	2,977	45.6	26.8	12.8	14.8
85—89	1,737	40.8	29.0	12.8	17.4	2,235	51.5	25.1	11.6	11.8
90-94	625	49.4	25.0	11.7	13.9	1,120	55.5	22.4	12.6	9.5
95+	133	55.6	19.5	16.5	8.3	287	58.5	25.4	8.7	7.3
total	11,876	34.7	27.5	15.3	22.5	11,021	44.4	26.4	13.2	16.0

Note : Per day expenditure class x-y means x thousand yen or more and less
       than y thousand yen.

Fig. 7 Inpatient expenditure per day for 12 months prior to death
        among those deceased elderly who used inpatient care in
        final 3 months consecutively

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