

A Cross-Sectional Study of Frailty Status Among the Elderly in a Japanese City

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Abstract

In order to formulate the prevention program under the Long Term Care Insurance (LTCI) scheme, the authors conducted a cross-sectional study of frailty status among the elderly in a Japanese city. The population studied was inhabitants of one city, Fukuoka prefecture. The 3000 inhabitants more than 65 years old were randomly selected from citizen registration by the city council. From June to September 2002, the trained interviewers visited to chosen inhabitants and gathered information using a structured questionnaire composing of demographic data (sex, age, address, household's type), health status, ADL, and IADL. The present study has clarified that most of the aged live independently, even though they have some level of chronic health problems, such as knee-joint disorder and hypertension. Furthermore, even if they have got some problems for their transfer ability, most of them stay independent for other ADL and IADL, such as eating, toileting, bathing and house affairs. There was an interesting difference between male and female for house affaire autonomy. For female, 90% of persons categorized "mobility level 5" were independent for house affaires. On the contrary, only 40% of same mobility level of male were independent for house affaires. This finding indicates the necessity of another important preventive program especially for male.

Key words: frailty, prevention, long term care insurance, ADL, IADL, Japan

❖ Introduction

The very rapid graying of society is on going in Japan. It is estimated that the percentage of population over 65 years old will be over 30% in 2025. Besides this very rapid ageing, the number of births has been decreasing, and in 2003 the Total Fertility Rate (TFR) has become 1.29¹⁾. Along with the economic development after the Second World War, the Japanese disease structure has dramatically changed from the acute diseases dominant pattern (i.e., infectious diseases) to the chronic diseases dominant one (i.e., can-

cer and cardio-vascular diseases).

This demographic change means the increase in dispende and the decrease in tax payers, which requires the Japanese government to re-organize the social security system.

With fewer children, more women working, and changing attitude toward family responsibilities, the traditional system of informal care-giving is widely perceived as inadequate to take care of the increasing number of the frail elderly. In fact, about 40% of the households with elderly people are now so called "aged households", that is, single old person's household or old couple's household. This situation naturally requires the socialization of care, and finally in 2000, the Japanese government implemented the Long Term Care Insurance (LTCI) as a new scheme for the frail elderly²⁾.

The health care reform debate often focuses largely on questions associated with the supply of ser-

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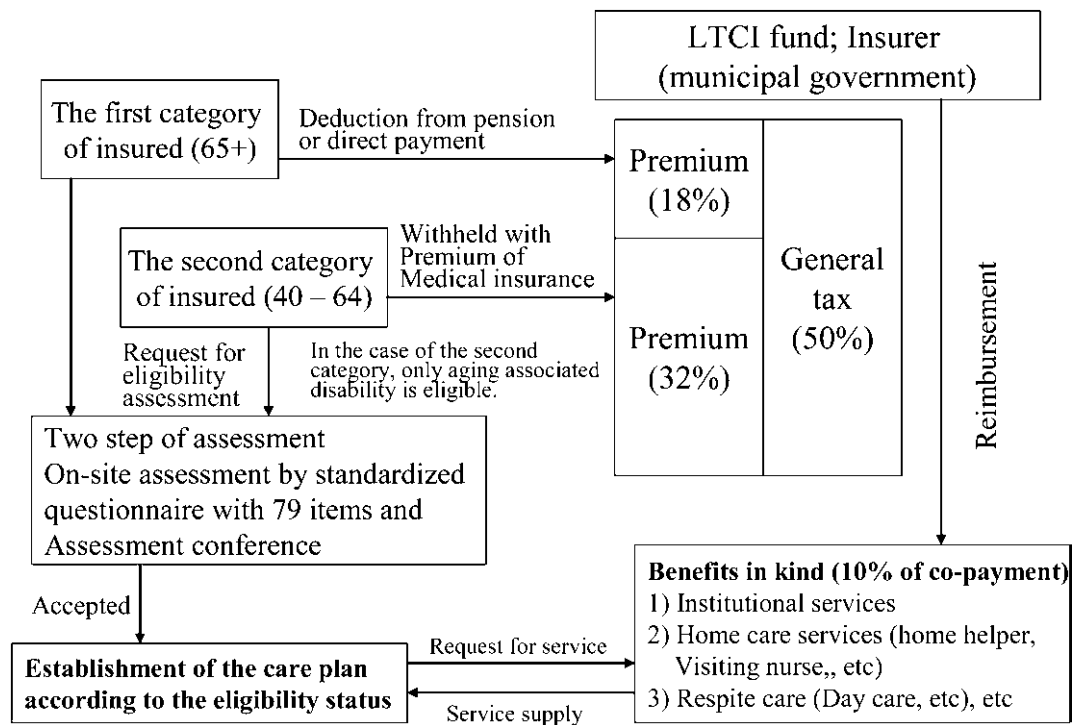


Figure 1. System of Long Term Care Insurance in Japan

vices, such as measures to organize, finance and deliver health care in the cost-effective way. Less attention has been paid to key aspects of the demand side, in particular how the need for medical and social services might be reduced by improving the health of population. In most of the countries, public health services have been kept quite separate from the curative sector, although it is widely recognized that the two sectors must work together for better health of population.

In order to make the social insurance scheme sustainable in the coming aged society, it is pivotal how to integrate preventive and health promotive activities into the health care system. In this perspective, the authors have investigated the health and ADL level of the aged living in one local government of Fukuoka prefecture, Japan.

❖ Long Term Care Insurance²⁾

Figure 1 describes the LTCI scheme (Modified in 2006). The budget of the insurance is based on fifty percent from the general tax and another fifty percent from the premium of the insured. There are two types of insured; the first category of insured who is 65+, and the second category of insured that is between the age of 40 and 64. The first category of insured is asked to pay a

premium deducted from pension or direct payment for insurer according to their pension status. In the case of the second category of insured, his or her premium is withheld from the medical insurance premium.

The benefit includes social welfare services such as home help and bathing service, stay in nursing home, as well as the use of medical services such as visiting nurses and institutional care in long term care hospitals.

The eligibility process begins with the individual or his/her family applying to the insurer (usually municipal government). A two-step assessment process follows and determines the limit of benefit. The first step is on-site assessment using the 79 items of a standardised questionnaire, each with a choice of three or four levels, plus space for comments on any particular aspects to be remarked on. The 79 items are analysed by an official computer program to classify the applicant into one of 6 levels of dependency or to reject eligibility¹. The lightest level is “assistance required” which is subject to preventive services; the other five levels are called “care required”. The second step is the assessment conference by health care professionals. The conference reviews the classification made by a computer program by taking into account the descriptive statement plus a report from

the applicant's home doctor.

Each eligibility level entitles the applicant to an explicitly defined monetary amount of services. The recipient has to pay 10% of the cost as co-payment. Theoretically, users are free to choose services, but in reality, the care-manager who constitutes a care plan, a weekly time schedule of services, intervenes in this process and co-ordinates the services for the applicant.

❖ Studied Population and Method

Studied population

The population studied was inhabitants of one city, Fukuoka prefecture. The 3000 inhabitants more than 65 years old were randomly selected from citizen registration by the city council.

Method

The trained interviewers visited to chosen inhabitants and gathered information using a structured questionnaire from June to September 2002. There was no case of refusal. The questionnaire composes of items regarding demographic data (sex, age, address, household's type), health status, ADL, and IADL. The name of studied people was excluded from the data for analysis in order to assure the privacy.

For evaluation of ADL and IADL, the Typology of Aged with Illustration (TAI) was used^{3,4}.

The statistical analyses were conducted by SPSS.

❖ Results

Basic statistics

Age distribution: 1034 persons (34.5%) were under 70 years old, 1392 persons (46.4%) were between 70 and 79, 510 persons (17.0%) were between 80 and 89, and 64 peoples (2.1%) were more than 90 years old. The average age was 73.4 years old (72.8 for male, 73.9 for female).

Sex distribution: 1746 were female (58.2%), and 1254 were male (41.8%).

Type of household: 473 persons (15.8%) were categorized into "live alone", 1209 (40.3%) were "aged household", and 1318 (43.9%) were "extended family".

The distribution of eligibility status of LTCI was as follows: Non-applicant (2637 persons; 54.8%), in-

process of eligibility evaluation (8; 0.2%), non-eligible (28; 0.6%), assistance required (77; 1.6%). Care required 1 (58; 1.2%), care required 2 (18; 0.4%), care required 3 (6; 0.1%), care required 4 (8; 0.2%), care required 5 (10; 0.2%), unknown or no answer (151; 3.1%).

Health status

206 persons (6.9%) had past and/or present history of cerebro-vascular diseases. 351 persons (11.7%) had past and/or present history of heart diseases. 561 persons (18.7%) had past and/or present history of osteo-articular diseases.

ADL and IADL level

ADL and IADL were measured by TAI scale. Each item in the TAI has six hierarchical status (5 to 0), representing levels of disability in each domain. Five represents no disability and 0 represents extreme disability. Each status is defined by a threshold and illustrated as shown in the example of mobility level (Figure 2), mental status (Figure 3), eating (Figure 4), and Toileting (Figure 5).

Mobility level: 2325 (77.5%) persons were categorized into "5", 311 (10.4%) were "4", 128 (4.3%) were "3", 13 (0.4%) were "2", 11 (0.4%) were "1" and 212 (7.1%) were "0".

Mental status: 2690 (89.7%) persons were categorized into "5", 75 (2.5%) were "4", 9 (0.3%) were "3", 14 (0.5%) were "2", 3 (0.1%) were "1" and 209 (7.0%) were "0".

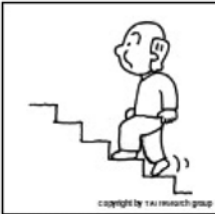

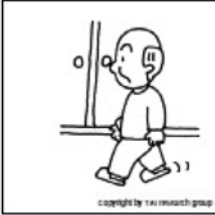








Eating independence: 2720 (90.7%) persons were categorized into "5", 53 (1.8%) were "4", 7 (0.2%) were "3", 4 (0.1%) were "2", 0 (0.0%) were "0" and 216 (7.2%) were "0".

Toileting independence: 2656 (88.5%) persons were categorized into "5", 94 (3.1%) were "4", 20 (0.7%) were "3", 15 (0.5%) were "2", 4 (0.1%) were "1" and 211 (7.0%) were "0".

Bathing independency: 2542 (84.7%) persons were categorized into "5", 160 (5.3%) were "4", 49 (1.6%) were "3", 26 (0.9%) were "2", 15 (0.5%) were "1" and 208 (6.9%) were "0".

Independency of house affaires: 1733 (57.8%) persons were categorized into "5", 201 (6.7%) were "4", 361 (12.0%) were "3", 57 (1.9%) were "2", 413 (13.8%) were "1" and 235 (7.8%) were "0".

Relationship between mobility level and other ADL items: Table 1 to Table 4 show the relationship

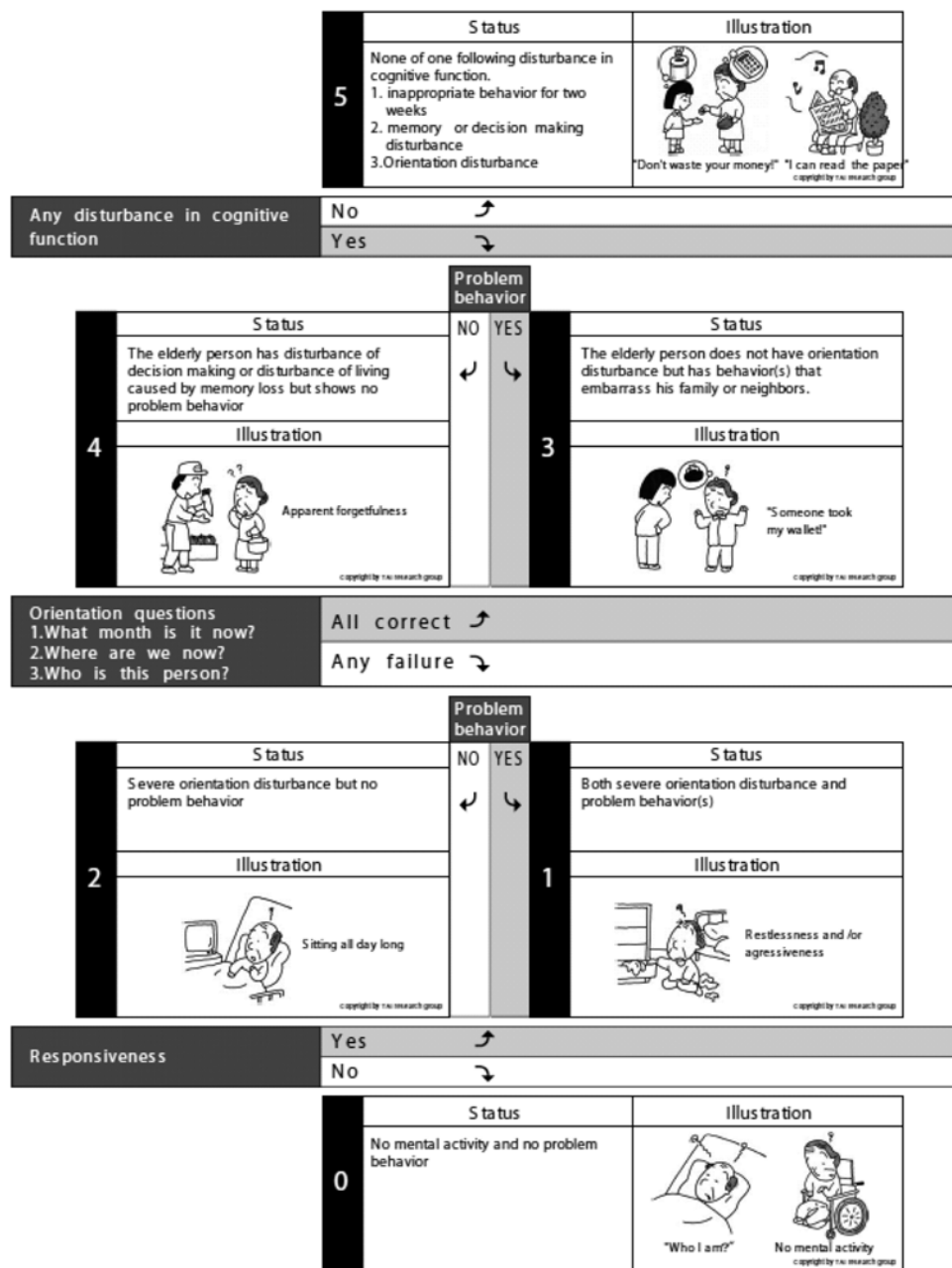
	Level	Status	Illustration
 <p>Climb stairs</p>	5	The elderly person can climb stairs without assistance and can walk out of a house.	
		Yes ↗	
 <p>Walk alone on a flat floor</p>	4	The elderly person can not climb stairs but can walk alone without assistance on a flat floor.	
		Yes ↗	
 <p>Both move around using equipment and transfer while sitting</p>	3	The elderly person cannot walk alone on a flat floor without help, but can move on a flat floor with instruments such as walking aid, wheelchair, cane, brace or walls.	
		Yes ↗	
 <p>Both sit up and maintain seated position</p>	2	The elderly person need help for transferring or moving, but can stand up from bed, and remain seated without help.	
		Yes ↗	
 <p>Roll over on the bed while lying</p>	1	The elderly person cannot transfer himself while sitting but can remain seated and change body position while lying.	
		Yes ↗	
	0	The elderly person cannot change body position while lying on a bed.	

Source: Okochi (2005)

Figure 2. TAI scale for mobility

between mobility level and other ADL items. In the case of eating and mental status, most of the elderly were relatively independent up to mobility level 3. However, the independent level has rapidly decreased from mobility level 4 for bathing and toileting. As the Japanese latrine requires squatting for toileting, and as the Japanese bath tub is usually very deep, the diffi-

culty in mobility will cause considerable difficulty in use of such activities. Another important point is that there is an interesting difference between male and female for house affaire autonomy (Table 5). For female, 90% of persons categorized “mobility level 5” were independent for house affaires. On the contrary, only 40% of same mobility level of male were inde-



Source: Okochi (2005)

Figure 3. TAI scale for mental status

pendent for house affairs.






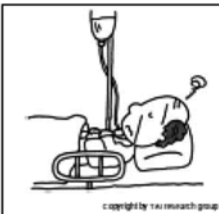


Discussion

The present study has clarified that most of the aged live independently, even though they have some level of chronic health problems, such as knee-joint disorder and hypertension. Furthermore, even if they have got some problems with their transfer ability,

most of them stay independent for other ADL and IADL, such as eating, toileting, bathing and house affairs.

According to the official statistics, number of persons who received the LTCI services increased from 218.2 thousands in 2000 to 302.5 thousands in 2003, and the largest increase was observed in persons categorized into "care required 1"⁵⁾.

The most common disorders among this category





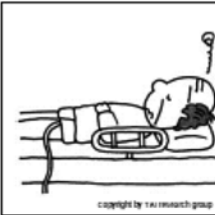

		Level	Status	Illustration
 <p>Stain around the table and/or require prepared food</p>	<p>No ↗</p> <p>Yes ↘</p>	5	<p>The elderly person can eat cleanly by himself even in a presence of paralysis or dementia and does not require preparation or aid at table.</p>	
 <p>Swallowing disturbance</p>	3	<p>The elderly person requires assistance while eating. However, there is no swallowing disturbance if the care giver brings foods to the mouth.</p>		
				 <p>Parenteral alimentation</p>
 <p>Intravenous alimentation</p>	1	<p>Parenteral alimentation (nasal, gastric or intestinal)</p>		
				 <p>Intravenous alimentation (intravenous, IVH)</p>

Source: Okochi (2005)

Figure 4. TAI scale for eating independency level

are osteo-muscler disorders, especially knee-joint problems⁶). According to our previous study, the elderly with knee-joint problems had 2 times more possibility to have other ADL and health problems, such as toileting and mental autonomy⁶). Therefore, it is very important to organize some preventive services for

them. In fact, 60 to 80% of frail elderly evaluated as non-eligible for LTCI scheme have the bone-articular problems. Previous studies have indicated that the prevention of disabilities consequent on non-fatal conditions, such as chronic arthritis, is the most cost-effective preventive strategy^{7, 8}).

		Level	Status	Illustration
 <p>Use toilet cleanly</p>	<p>No ↗</p> <p>Yes ↘</p>	5	<p>The elderly person goes to toilet by himself and shows no failure of excretion for at least two weeks. There is no portable toilet or other aid at bedside.</p>	
 <p>Use diaper always</p>	<p>No ↗</p> <p>Yes ↘</p>	3	<p>The care giver must give instruction or help to the elderly to go to the toilet. The elderly person does not always require diaper.</p>	
 <p>Catheterization</p>	<p>No ↗</p> <p>Yes ↘</p>	1	<p>The care giver has difficulty changing the diaper of the elderly person. Therefore, it requires two persons to change the diaper. The elderly person may exhibit polluting of surroundings by urine, problem behaviour with urine, and toileting on the bed.</p>	

Source: Okochi (2005)

Figure 5. TAI scale for toileting independency level

After the introduction of the LTCI scheme, the two service categories have largely increased their users; home help services and day services. Home helpers assisted the frail elderly for house affairs, especially toileting and bathing, and day service centers offer them cafeteria and bathing services.

Based on the findings of this study, the city office has organized preventive services for the non-eligible elderly. The first-year result of this program was very encouraging. Among 199 persons receiving the preventive services, such as rehabilitation and aid services, only 5 persons had entered into LTCI scheme or

Table 1. Relationship between mobility level and mental status level

Mobility		Mental status						Total
		0	1	2	3	4	5	
0	N	201	1	1		1	5	209
	Mobility (%)	96.2	0.5	0.5		0.5	2.4	100.0
	Mental (%)	97.6	33.3	7.1		1.4	0.2	7.3
1	N	2			3	3	3	11
	Mobility (%)	18.2			27.3	27.3	27.3	100.0
	Mental (%)	1.0			33.3	4.1	0.1	0.4
2	N	1		2		3	6	12
	Mobility (%)	8.3		16.7		25.0	50.0	100.0
	Mental (%)	0.5		14.3		4.1	0.2	0.4
3	N		1	6	1	26	92	126
	Mobility (%)		0.8	4.8	0.8	20.6	73.0	100.0
	Mental (%)		33.3	42.9	11.1	35.1	3.6	4.4
4	N		1	4	3	31	269	308
	Mobility (%)		0.3	1.3	1.0	10.1	87.3	100.0
	Mental (%)		33.3	28.6	33.3	41.9	10.5	10.7
5	N	2		1	2	10	2188	2203
	Mobility (%)	0.1		0.0	0.1	0.5	99.3	100.0
	Mental (%)	1.0		7.1	22.2	13.5	85.4	76.8
Total	N	206	3	14	9	74	2563	2869
	Mobility (%)	7.2	0.1	0.5	0.3	2.6	89.3	100.0
	Mental (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 2. Relationship between mobility level and eating level

Mobility		Eating level					Total	
		0	1	2	3	4		
0	N	200		3	1	3	2	209
	Mobility (%)	95.7		1.4	0.5	1.4	1.0	100.0
	Mental (%)	93.9		75.0	14.3	6.1	0.1	7.3
1	N			1	4	3	3	11
	Mobility (%)			9.1	36.4	27.3	27.3	100.0
	Mental (%)			25.0	57.1	6.1	0.1	0.4
2	N				2	4	6	12
	Mobility (%)				16.7	33.3	50.0	100.0
	Mental (%)				28.6	8.2	0.2	0.4
3	N					21	105	126
	Mobility (%)					16.7	83.3	100.0
	Mental (%)					42.9	4.0	4.4
4	N	1				17	290	308
	Mobility (%)	0.3				5.5	94.2	100.0
	Mental (%)	0.5				34.7	11.2	10.7
5	N	12				1	2190	2203
	Mobility (%)	0.5				0.0	99.4	100.0
	Mental (%)	5.6				2.0	84.4	76.8
Total	N	213		4	7	49	2596	2869
	Mobility (%)	7.4		0.1	0.2	1.7	90.5	100.0
	Mental (%)	100.0		100.0	100.0	100.0	100.0	100.0

Table 3. Relationship between mobility level and toileting independency level

Mobility		Toileting independency level						Total
		0	1	2	3	4	5	
0	N	201	2	4			2	209
	Mobility (%)	96.2	1.0	1.9			1.0	100.0
	Mental (%)	96.6	50.0	26.7			0.1	7.3
1	N		1	7		2	1	11
	Mobility (%)		9.1	63.6		18.2	9.1	100.0
	Mental (%)		25.0	46.7		2.2	0.0	0.4
2	N			3	5	3	1	12
	Mobility (%)			25.0	41.7	25.0	8.3	100.0
	Mental (%)			20.0	26.3	3.3	0.0	0.4
3	N			1	7	53	65	126
	Mobility (%)			0.8	5.6	42.1	51.6	100.0
	Mental (%)			6.7	36.8	57.6	2.6	4.4
4	N	1	1		5	27	274	308
	Mobility (%)	0.3	0.3		1.6	8.8	89.0	100.0
	Mental (%)	0.5	25.0		26.3	29.3	10.8	10.7
5	N	6			2	7	2188	2203
	Mobility (%)	0.3			0.1	0.3	99.3	100.0
	Mental (%)	2.9			10.5	7.6	86.4	76.8
Total	N	208	4	15	19	92	2531	2869
	Mobility (%)	7.2	0.1	0.5	0.7	3.2	88.2	100.0
	Mental (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 4. Relationship between mobility level and bathing independency level

Mobility		Bathing independency level						Total
		0	1	2	3	4	5	
0	N	200	6	1			2	209
	Mobility (%)	95.7	2.9	0.5			1.0	100.0
	Mental (%)	97.6	42.9	4.0			0.1	7.3
1	N		6	5				11
	Mobility (%)		54.5	45.5				100.0
	Mental (%)		42.9	20.0				0.4
2	N			5	3	3	1	12
	Mobility (%)			41.7	25.0	25.0	8.3	100.0
	Mental (%)			20.0	6.1	1.9	0.0	0.4
3	N	1		14	36	59	16	126
	Mobility (%)	0.8		11.1	28.6	46.8	12.7	100.0
	Mental (%)	0.5		56.0	73.5	37.8	0.7	4.4
4	N	2			9	78	219	308
	Mobility (%)	0.6			2.9	25.3	71.1	100.0
	Mental (%)	1.0			18.4	50.0	9.0	10.7
5	N	2	2		1	16	2182	2203
	Mobility (%)	0.1	0.1		0.0	0.7	99.0	100.0
	Mental (%)	1.0	14.3		2.0	10.3	90.2	76.8
Total	N	205	14	25	49	156	2420	2869
	Mobility (%)	7.1	0.5	0.9	1.7	5.4	84.3	100.0
	Mental (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 5. Relationship between mobility level and house affaire independency level

Male		House affaire independency level						
Mobility		0	1	2	3	4	5	Total
0	N	69			1			70
	Mobility (%)	98.6			1.4			100.0
	Mental (%)	82.1			0.4			5.9
1	N	1	1				1	3
	Mobility (%)	33.3	33.3				33.3	100.0
	Mental (%)	1.2	0.3				0.3	0.3
2	N		3					3
	Mobility (%)		100.0					100.0
	Mental (%)		0.9					0.3
3	N	5	32	4	8	1		50
	Mobility (%)	10.0	64.0	8.0	16.0	2.0		100.0
	Mental (%)	6.0	9.6	14.3	3.1	1.2		4.2
4	N	3	36	6	23	14	8	90
	Mobility (%)	3.3	40.0	6.7	25.6	15.6	8.9	100.0
	Mental (%)	3.6	10.8	21.4	9.0	16.3	2.0	7.6
5	N	6	262	18	224	71	390	971
	Mobility (%)	0.6	27.0	1.9	23.1	7.3	40.2	100.0
	Mental (%)	7.1	78.4	64.3	87.5	82.6	97.7	81.8
Total	N	84	334	28	256	86	399	1187
	Mobility (%)	7.1	28.1	2.4	21.6	7.2	33.6	100.0
	Mental (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Female		House affaire independency level						
Mobility		0	1	2	3	4	5	Total
0	N	137	1				1	139
	Mobility (%)	98.6	0.7				0.7	100.0
	Mental (%)	93.2	1.6				0.1	8.3
1	N	4	4					8
	Mobility (%)	50.0	50.0					100.0
	Mental (%)	2.7	6.6					0.5
2	N	1	5	2	1			9
	Mobility (%)	11.1	55.6	22.2	11.1			100.0
	Mental (%)	0.7	8.2	7.4	1.1			0.5
3	N	2	20	15	18	13	8	76
	Mobility (%)	2.6	26.3	19.7	23.7	17.1	10.5	100.0
	Mental (%)	1.4	32.8	55.6	20.2	12.3	0.6	4.5
4	N		13	8	36	74	87	218
	Mobility (%)		6.0	3.7	16.5	33.9	39.9	100.0
	Mental (%)		21.3	29.6	40.4	69.8	6.9	13.0
5	N	3	18	2	34	19	1156	1232
	Mobility (%)	0.2	1.5	0.2	2.8	1.5	93.8	100.0
	Mental (%)	2.0	29.5	7.4	38.2	17.9	92.3	73.2
Total	N	147	61	27	89	106	1252	1682
	Mobility (%)	8.7	3.6	1.6	5.3	6.3	74.4	100.0
	Mental (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0

hospitalized⁶⁾. The city office estimated its financial effect as about 40 million yen (400 thousand US \$) of cost containment per year. Encouraged by these results, the city office enlarged this program from 2003 in order to rationalize the expenditure for the LTCI services. According to these encouraging results, the Ministry of Health, Labor and Welfare has decided to enforce preventive activities under the LTCI scheme. Some new preventive services are planned to be included into the LTCI scheme from 2006.

In order to ameliorate the autonomy level of the elderly people, the current study has revealed an interesting finding about house affairs autonomy level. As indicated in Table 5, there was an interesting difference between male and female for house affairs autonomy. For female, 90% of persons categorized “mobility level 5” were independent for house affairs. On the contrary, only 40% of same mobility level of male were independent for house affairs. This finding indicates the necessity of another important preventive program especially for male. The above fact suggests that the male elderly has a higher possibility to use home help services compared with the female elderly, if they become slightly frail. The city office is planning to organize community education classes for the male adults where they can learn how to manage house affairs, such as cooking and cleaning.

The present study is a cross-sectional study, thus it is not appropriate to derive a definitive conclusion from the current findings. We are following this population from 2002 consecutively. We would like to present further findings from the on-going cohort study in the future literatures.

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❖ Note

- ¹ By the modification of LTCI law in 2006, “care required 1” was divided into “assistance required 2” and “care required 1”, and “assistance required” was renamed “assistance required 1”.