Kersting, 2001). This is probably due to the association of lower health status with low income, especially when there are no income-related barriers to long-term nursing home care.

To our knowledge, no study has examined the risk of institutionalization in Japan. It is very important, however, to know the effect of income on institutional care use in Japan under the public LTCI, since the 90% fee coverage for institutional care means that there are very few income-related barriers. The strength of this study is that we obtained all the income class data from public records, and Care-Level data for all the elderly in one area, including those in institutions and those at home. Since the introduction of LTCI was a drastic change in policy, it is urgent that we identify factors relating to institutionalization under the new LTCI to allow adequate development of this new system.

The purpose of this study was to investigate factors related to institutionalization in Japan using an adequate sample, consisting of all the data for one area.

Materials and Methods

The survey was conducted in six towns in the Kimotsuki district, in Kagoshima prefecture, located in southern Japan. The population of the towns at the time of the study was 53,449, and 30.0% of the population were elderly (aged ≥ 65 years).

An interview survey was conducted between December 2001 and January 2002, after the introduction of LTCI in April 2000. The initial study population included all the elderly who used any one of the services under LTCI (n=2,158). Of these users, 1,580 were living in their own homes and used some home service, and 578 were staying in

institutions under LTCI. The list of users was obtained from the six municipal bodies. From the list, we obtained information on 1,525 elderly living in their own homes (response rate=97%), and 563 living in institutions (response rate=97%). Although the LTCI covers those younger than 65 when they have certain diseases, we excluded 52 at home and 12 in institutions who were under 65 years old. The elderly whose Care-Level was "needs-assistance" (more independent than Care-Level 1; they are not permitted to be institutionalized under the new LTCI unless they were a previous continuous user) were also excluded; this included 337 home, and one in an institution.

The subjects of the analyses consisted of 1,136 elderly living at home and 550 in institutions (318 in welfare-based nursing homes, 184 in intermediate care facilities, and 44 in medical long-term care hospitals, four whose type of institution data were not available)

Each subject was asked questions about the user's sex, age, family structure, main cause of disability, eligible Care-Level (1-5), and Income-Level (1-5), based on the national standards for LTCI. The criteria for the national Income Level and one example of insurance premiums, which differ for each municipal body, are shown in Appendix 2.

We compared those at institutions of any type and those at home, and we compared the three types of institutions separately. In the simple comparison, we used either the Chi-squared test or Fisher's exact test for categorical variables, according to the size of each cell in the tables. To investigate the sole effect of Income-Level on institutional care after controlling for related factors, we first calculated the Spearman's correlation coefficient between Income-Level and Care-Level, and showed the percentage of places of care after stratification by each Care-Level and living alone or

not.

To see the independent effect of the various factors for institutionalization, a stepwise multiple logistic regression analysis was performed, and the multiple adjusted OR and its 95% confidence intervals (CI) were obtained. The inclusion and exclusion criteria for the stepwise regression were both 20% (Hosmer and Lemeshow, 1989), to include more variables in the final model, and to allow for some protection against confounders. The Hosmer and Lemeshow test was used for the goodness-of-fit test statistic of the model. The 95% CI were based on the likelihood test statistics. We also analyzed the effects of interactions of living alone with Care-Level and Income-Level because they were reported to be important factors for institutionalization, and they seemed to be correlated with each other in our data. (The criterion Income-Level includes the aspect of family structure: Appendix 2.)

All analyses used procedures in the Statistical Analysis System (SAS Institute Inc., 1998). The level of significance was set at 0.05, unless mentioned otherwise.

This study was approved by the internal review board of the author's institution.

Result

The characteristics of the elderly cared for at home and in institutions are shown in Table 1. Users in the institution groups were significantly more often female, older, in a higher Care-Level and lower Income-Level, and had more CVD and dementia, as compared to the home group. In the comparison of the three types of institution, the results of the simple comparisons were no different from the result for all the institutions (data not shown).

The proportions of places of care by Income-Level are shown in Figure 1. The proportion of elderly at home increased with Income-Level.

The distribution of elderly classified by Care-Level and Income-Level is shown in Fig. 2. Spearman's correlation coefficient between the two factors was –0.065 ($p<0.01$) indicating an association between higher Care-Level and lower Income-Level. The proportions of elderly cared for at home and in institutions classified by Income-Level in each Care-Level are shown in Fig. 3. Although the sample size in each group after stratification was small, the proportion in the Home-Care group tended to increase with Income-Level at every Care-Level. The proportion of elderly who were living alone at each Income-Level is shown in Fig. 4. The proportion decreased linearly as Income-Level increased. The proportions of elderly cared for in institutions at each Income-Level, and for those living alone and those living with others, are shown in Fig. 5. In both groups, the proportion in institutional care decreased with increasing Income-Level.

The results of the multiple logistic regression analysis are shown in Table 2. Female (OR=1.8; 95%CI=1.29-2.44), old age (1.9; 1.49 -3.19), higher Care-Level (2.8; 2.32- 2.84), living alone (2.3; 1.46-2.62), and CVD (1.6; 1.19-2.21) and dementia (3.2; 2.23-4.77) as causes of disability were positively related to institutionalization. By contrast, higher Income-Level (Income-Level 4 and 5, compared to Income-Level 1) was a significant factor decreasing institutionalization (0.2; 0.11-0.85). The interactions of 'living alone' with both Care-Level and Income-Level were significant, but the other significant factors did not change either model, with or without the inclusion of these interactions (data not shown).

Discussion

In the multiple adjusted logistic models, a higher Income-Level was significantly related to a decrease in institutional care, and the factors positively related to institutionalization were female, old age, higher Care-Level, living alone, CVD and dementia.

The unique finding of this study was that of the significant inverse relationship between income level and institutionalization, even after adjusting for Care-Level or living alone. A significant correlation between Care-Level and Income-Level was demonstrated for the first time in Japan. The relationship between income and institutionalization is still controversial in studies that have been conducted in other countries. Two recent studies have shown that the effect of income disappeared after controlling for home ownership (Tomiak *et al.*, 2000; Hancock *et al.*, 2002). In our study, however, all the elderly owned their homes. The effects of income are reported to depend mainly on the insurance coverage and the system allocating the elderly to an institutional setting (Kelman & Thomas, 1990).

In Japan, coverage for the cost of services provided by LTCI is 90%, regardless of the place of care, and social welfare benefits without co-payment for low-income elderly covers people in both settings. The difference in the maximum applicable costs for institutional care and home care is small (Appendix 1). This means that there are few income-related barriers to institutional care in Japan, as compared to the lower coverage and higher institutional costs in other countries. Therefore, according to the literature, the selection of institutional care in relation to lower income may be due to the lower health status related to lower income. However, our results showed that lower income was

significantly related to institutional care, even after adjusting for Care-Level. This suggests that elderly individuals with a lower income tend to choose institutional care, and that the relative cost of institutionalization is lower, as compared to home care. One study in Japan before LTCI (Kobayashi & Reich, 1993) showed that the cost of home care was higher than that of institutional care, when opportunity costs for informal care were included. In Japan, informal care still plays an important role in home care settings. In the German long-term care insurance system, which has provided in-home care benefits since 1995, 80% of the beneficiaries choose cash benefits for informal care over professional services, and most informal caregivers are covered by social security (Motozawa, 1996). By contrast, there is no cash benefit to informal caregivers at home, and no social security for informal caregivers in Japan. One study showed that the caregivers' conditions were independently important for home discharge of CVD inpatients in Japan, and the study raised some doubts about the promotion of home care in Japan, even with sufficient professional home care services, unless there is support for informal caregivers (Tamiya *et al.*, 2001). In April 2003, in a modification of the LTCI, the maximum allowance for home care cost was increased to benefit home care providers, but the 10% co-payment for users increased correspondingly, and the relative cost of institutional care has become lower as a result. There is concern that with this change, more elderly will choose institutional care, and the results of our study provide a basis for this concern. The present home care service system under LTCI may not be effective for keeping the elderly at home.

Our findings that female, old age, higher Care-Level, living alone, and dementia are risk factors for institutional care are in accord with studies in other countries or with studies on the home return of discharged elderly patients, conducted in Japan (Kuroda *et*

al., 1992; Ishizaki *et al.*, 1995; Tamiya *et al.*, 2001).

Adequate allocation of institutional care is an urgent issue for municipal bodies, as the insurers, given that there are still long waiting lists for institutional care in Japan. It is necessary, therefore, to identify the high-risk group for institutionalization. However, there is no systematic information on family situation available under the present LTCI system. Rather, the social condition of the elderly is intentionally omitted from the judgment on eligibility because the introduction of LTCI was intended to socialize elderly care. Some municipal bodies have attempted to identify users living alone and prioritize them for institutionalization, and this may prove effective for the adequate allocation of institution beds. To allow the elderly at higher risk to use more home care services at lower cost, or to provide some benefit to informal caregivers, may be an effective intervention for preventing institutionalization. In fact, there is a tentative subsidization policy for the elderly in the community who have previously received social welfare services, which allows them to use home-helpers at lower cost. The elderly population who had previously received social welfare services were identified by the old welfare system; they were in the low Income-Levels and mainly living alone. Our previous study in the same towns showed that subsidized individuals used significantly more home-helpers than non-subsidized people (Sato *et al.*, in submission). In our study population, some elderly had used this subsidization for home care, but institutionalization is not necessarily comparable with subsidization because the subsidization in question here is only for the elderly in a community setting. The results of our study could be firmer if we could adjust this effect.

This is the first study to identify factors related to institutionalization, based on all the applicable subjects in one area, using public data. Despite the limitations of the

study, which include its cross-sectional nature and the small size of the population, preventing sufficient stratification, our results constitute an important step in forward in understanding the risk factors for institutionalization in Japan.

Conclusions

Elderly people with a low-income appear more likely to be institutionalized, and they seek more intensive and broader coverage; this tendency is independent of the care level or whether they are living alone. This study found that that elderly female individuals with a lower income, who were older, required a higher care-level, and had CVD and dementia, were at a higher risk for institutionalization. This population may be targeted for intervention in order to avoid institutionalization. Furthermore, the findings suggest that the present home care service system under the LTCI in Japan could be improved, to allow the elderly who require care to stay at home.

References

Ahmed, A., Allman, R.M.,& DeLong ,J.F. (2003). Predictors of nursing home admission for older adults hospitalized with heart failure. *Arch Gerontol Geriatr* , 36(2),117-126.

Campbell, J.C.,& Ikegami, N. (2000). Long-term care insurance comes to Japan. *Health Aff*, 19(3),26-39.

Coughlin, T.A., McBride, T.D., & Liu, K. (1990). Determinants of transitory and permanent nursing home admissions, *Med Care,* 28(7),616-31.

Foley ,D.J., Ostfeld, A.M., Branch, L.G, Wallace, R.B., McGloin, J.,& Cornoni-Huntley, J.C.(1992). The risk of nursing home admission in three communities. *J Aging Health,* 4(2),155-73.

Freedman, V.A., Berkman, L.F., Rapp ,S.R., & Ostfeld ,A.M. (1994). Family networks: predictors of nursing home entry. *Am J Public Health,* 84(5),843-5.

Greene,V.L.,& Ondrich,J.I. (1990). Risk factors for nursing home admissions and exits: a discrete-time hazard function approach. *J Gerontol* , 45(6),S250-8.

Hancock, R., Arthur, A., Jagger ,C., & Matthews ,R. (2002). The effect of older people's economic resources on care home entry under the United Kingdom's long-term care financing system. *J Gerontol B Psychol Sci Soc Sci,* 57(5),S285-93.

Hosmer, D.W.,& Lemeshow , S.(1989). Applied Logistic Regression. New York, NY :
John Wiley & Sons,Inc.

Ikegami, N., Yamauchi, K., & Yamada ,Y.(2003). The long term care insurance law in
Japan: impact on institutional care facilities. *Int J Geriatr Psychiatry* ,18(3),217-21.

Ishizaki ,T., Kai, I., Hisata, M., Kobayashi, Y., Wakatsuki, K., & Ohi, G.(1995).Factors
influencing users' return home on discharge from a geriatric intermediate care facility in
Japan. *J Am Geriatr Soc,* 43,623-626.

Kelman, H., R, & Thomas, C. (1990).Transitions between community and nursing home
residence in an urban elderly population. *J Community Health*, 15(2),105-22.

Kersting, R.C.,(2001),Impact of social support, diversity, and poverty on nursing home
utilization in a nationally representative sample of older Americans. *Soc Work Health
Care*, 33(2),67-87.

Kobayashi, Y.,& Reich ,M.R.(1993), Health care financing for the elderly in Japan. *Soc
Sci Med* , 37,343-353.

Kuroda, K., Tatara, K., Takatorige, T., Zhao, L., & Shinsho, F.(1992). Factors related to
long-term stay in hospital by elderly people in a Japanese city. *Age Ageing* , 21(5),321-7.

Liu, K., Coughlin, T., & McBride, T.(1991). Predicting nursing-home admission and

length of stay. A duration analysis. *Med Care* , 29(2),125-41.

Mittelman, M.S., Ferris ,S.H., Shulman, E., Steinberg, G., & Levin, B.(1996). A family
intervention to delay nursing home placement of patients with Alzheimer disease. A
randomized controlled trial. *JAMA* , 276(21),1725-31.

Ministry of Health, Labor and Welfare (Japan), (2003). *Kokumin Eisei no Doko (Health
State of the Nation, Annual Report)*. Tokyo: Health, Labor and Welfare Statistics
Association (In Japanese).

Motozawa ,M. (1996). *Kouteki Kaigo Hoken: Doitsu no Sen-rei ni Manabu (Public
long-term care insurance: learning from the experience of Germany)*. Tokyo:
Nihonhyoronsha Press.(In Japanese)

Mustard ,C., Finlayson ,M., Derksen ,S., & Berthelot ,J.M. (1999). What determines the
need for nursing home admission in a universally insured population? *J Health Serv Res
Policy* , 4(4),197-203.

SAS Institute, Inc.(1998).*SAS, Statistical Analysis System. Software Release 6.12.*
Cary,NC:SAS Institute, Inc.,

Tamiya, N., Kobayashi ,Y., Murakami, S., Sasaki, J., Yoshizawa, K., & Otaki, J.(2001).
Factors related to home discharge of cerebrovascular disease patients, one-year follow-up
interview survey of caregivers of hospitalized patients in 53 acute care hospitals in Japan.

Archives of Gerontology and Geriatrics, 33(2),109-121.

Tomiak ,M., Berthelot, J.M., Guimond ,E., & Mustard ,C.A. (2000).Factors associated
with nursing-home entry for elders in Manitoba, Canada *J Gerontol A Biol Sci Med Sci*,
55(5),M279-87.

Appendix 1 Maximum monthly costs for institutional care and home care covered under

LTCI

Care-Level	Institutional Care			Home Care
	NH	GICF	Medical Care	
1	24.2	26.8	34.2	16.6
2	25.6	28.3	35.6	19.5
3	26.9	29.8	36.9	26.8
4	28.3	31.3	38.2	30.6
5	29.6	32.9	39.5	35.8

(units: 10,000¥/month, 1$=120Y)

Appendix 2 The national criteria for income level (Income Level) and one example of insurance premiums

Income-Level	Criteria	Monthly insurance premium
1	Recipient of livelihood subsidies or elderly who were born before 1911 (over 91 years old), and none of their family are paying resident tax.	17,400\
2	None of their family are paying resident tax	26,100\
3	The elderly not paying resident tax; someone in the family is paying resident tax	34,900\
4	The elderly paying resident tax (total yearly income less than 2,500,000 yen)	43,600\
5	The elderly paying resident tax (total yearly income over 2,500,000 yen)	52,300\

(1$=120Y)

Table 1 Simple statistics comparing the elderly at home and in institutions

		Institutions		Home		χ^2	p-value
		N	%	N	%		
Sex						13.07	0.0003
	missing	.	.	26	100		
	male	122	26	340	74		
	female	428	36	770	64		
Age							
	missing	1	3	29	97	42.384	<.0001
	65-69	21	25	63	75		
	70-74	39	19	162	81		
	75-79	91	29	223	71		
	80-84	121	31	264	69		
	85-	277	41	395	59		
Care-Level							
	missing	3	6	45	94	480.64	<.0001
	1	66	9	643	91		
	2	78	28	205	72		
	3	93	45	114	55		
	4	131	65	71	35		
	5	179	76	58	24		
Living alone							
	no	321	31	712	69	2.90	0.0883
	yes	229	35	424	65		
Income Level							
	missing					19.78	<.0001
	1	39	45	47	55		
	2	417	37	722	63		
	3	85	21	315	79		
	4	8	17	39	83		
	5	1	7	13	93		

Table 1 continued

Diseases causing care need status

CVD

no	321	28	820	72	32.35	<.0001
yes	229	42	316	58		

RA

no	518	36	903	64	60.39	
yes	32	12	233	88		

Fall, Fracture

no	517	33	1069	67	0.01	0.9337
yes	33	33	67	67		

Dementia

no	432	29	1036	71	52.689	<.0001
yes	118	54	100	46		

All		550	33	1136	67	

*Income was recategorized as (income1=1, income2&3=2, income4&5=3) for the

Chi-squared test

Table 2 Multiple adjusted ORs for institutionalization

Covariate	OR	95% CI	
Sex (female=1)	1.8	1.29	2.44
Age (over75=1)	1.9	1.49	3.19
Care-Level	2.8	2.32	2.84
Living alone	2.3	1.46	2.62
Income-Level (2,3)	0.7	0.42	1.28
Income-Level (4,5)	0.2	0.11	0.85
CVD	1.6	1.19	2.21
Dementia	3.2	2.23	4.77
Fracture	1.3	0.89	2.63
(χ^2, df, p)	7.0636	8	0.5298

Referent of Income-Level: Level 1

Figure Captions

Figure 1   Proportion of places of care by Income-Level

Figure 2   Distribution of Care-Levels and Income-Levels

Figure 3   Percentage of Home and Institutions stratified by Care-Level

Figure 4   Proportion of living alone by Income-Level

Figure 5   Proportion of Institutional Care by Income-Level

            (stratified by living alone or not)
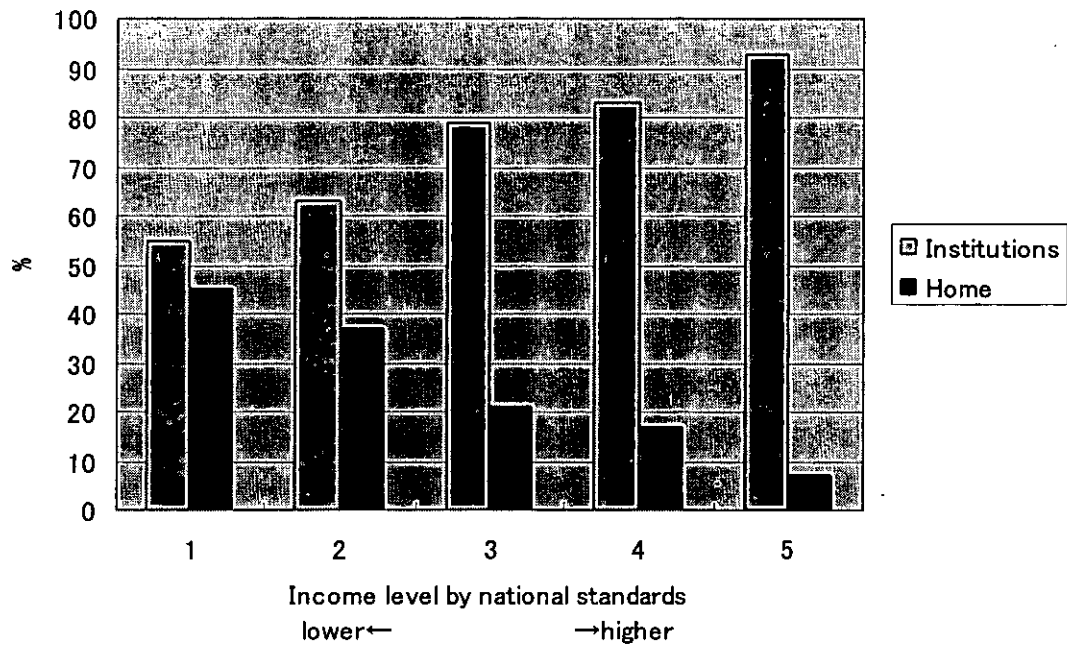
Fig.1 Propotion of places of care by Income level

Fig.2 Distribution of Care-Levels and Income-Levels