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In-depth descriptive analysis of trends in prevalence of long-term care in Japan

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Background: Long-term care (LTC) insurance was introduced in Japan in 2000. Herein, we describe the trends in demand for LTC, using age-standardized and level-specific rates of entitlement and utilization of LTC at national and prefectural levels.

Methods: We analyzed LTC data from 2002–2005 to examine: (i) the influence of population aging, calculating crude and age-standardized entitlement and utilization rates; (ii) the relation between baseline entitlement rate and increase in the rate over this 3-year period; and (iii) differences in increases in entitlement rate between low and high care levels.

Results: The entitlement and utilization rates increased even after adjustment for age; approximately two-thirds of the increase was not due to population aging. Variations in the entitlement rates among prefectures did not decrease (coefficient of variance was 0.12 in 2002 and 0.11 in 2005), and there was no significant correlation between baseline entitlement rates and the later increases among prefectures ($r = -0.20$, $P = 0.19$). The increase in entitlement rate was larger for low than for high care levels (31% vs 6%), and those for low and high care levels were weakly correlated.

Conclusion: This study suggested that a large part of the increase in LTC demand could not be explained by population aging, and the increase did not result from equalization of LTC services across the country. In addition, it seems that the demands of low and high care levels depend on different factors. The increase in LTC demand should be monitored carefully to identify underlying factors and to ensure sustainability of the system.

Keywords: aged, descriptive epidemiology, health policy, long-term care.

Introduction

Japan has the highest rate of population aging worldwide, with the percentage of elderly people (≥ 65 years) being 19.5% in 2004 and expected to reach 35.7% by 2050.¹ Long-term care (LTC) insurance was introduced in 2000 for the elderly requiring nursing care in Japan. This system, which includes certification procedures, criteria of certification, benefit services and fee schedules, is

universal across the country, with people aged 40 years and over having compulsory insurance. People aged 65 years or over who require sustained nursing care, and those aged 40–64 years with 15 specified diseases, are eligible for LTC under this scheme.¹

The number of those certified as requiring care services and receiving insurance benefits has increased steadily in Japan since the introduction of LTC insurance. According to the Ministry of Health, Labor and Welfare, the number of certified people increased from 1.49 million in April 2000 to 2.97 million in April 2004.² The increases in LTC demand will result in an increased cost to society, and it is therefore necessary to carefully explore the factors associated with the increased demands.

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The needs and utilization of health and welfare services are dependent on various factors, such as demographic features, sociocultural context and other factors.³⁻⁷ At the individual level, socioeconomic factors, such as income and family context, are critical factors associated with needs and utilization of medical and nursing care.⁸⁻¹² Despite the large number of studies on the factors associated with increased health-care needs and health expenditure, little is known about the factors associated with increases in LTC demand.

The present study was performed to examine the following three hypotheses for the increase in LTC demand in Japan:

- 1 Population aging: the increase in LTC demand may be due to the increase in number of elderly people and population aging.
- 2 Equalization of services: the services of LTC insurance may have had an inhomogeneous distribution, especially among different regions. Thus, the increase in LTC demand may be a process of the equalization and diffusion of LTC services.
- 3 Decrease in health level: the health level of the elderly population may have deteriorated, and the number of elderly patients with disabilities and need for nursing care may have increased.

To determine whether these hypotheses can explain the observed increases in LTC demand, we performed a detailed analysis of the data of LTC insurance, including the rates of people certified as requiring LTC (entitlement rate) and of people using LTC insurance benefits (utilization rate). In this study, we examined the influence of population aging by comparing crude and age-standardized rates, the relations between baseline rates and the observed increases, and difference in the rate increase between low and high care levels.

Methods

Data sources

The LTC insurance data from 2001–2005 were taken from the database of the Ministry of Health, Labor and Welfare.¹³ The prefecture-specific data regarding the numbers of certified people and of those receiving LTC insurance services divided by sex and age group (5-year intervals) and care level were reported monthly beginning in May 2002. Prior to May 2002, only national data by age group and care level were available.

National population data were based on the estimated population obtained from the Statistics Bureau, the Ministry of Internal Affairs and Communications.^{14,15} The prefecture-specific populations in March 2002 and 2005 were based on the residential registration records, and data by sex and age group (5-year intervals) were obtained from the Ministry of Internal Affairs and

Communications.^{14,15} Age standardization of entitlement and utilization rates was conducted using the national population of 2002.

Although the LTC insurance data included those for people aged 64 years and under, certified people and those receiving LTC insurance services in this age group comprised only approximately 5% of the total number.¹³ Therefore, this study was restricted to the data for people aged 65 years and over.

Influence of population aging determined by comparison between crude and age-adjusted rates

To classify the increase in number of certified people into two portions that were attributed to population aging and that were not attributed to population aging, we calculated the expected number of certified people using the following formula:

$$\sum (\text{entitlement rate of age-category } i \text{ in 2002}) \times (\text{population of age-category } i \text{ in year } x).$$

The difference between the expected number in year x and the number of certified people in 2002 was assumed to be the proportion of the increase due to population aging. Conversely, the difference between the expected number and actual number of certified people in year x was assumed to be the proportion of the increase not due to population aging.

Relation between baseline rate and rate increase

To determine the influence of the equalization of services on the increase in LTC demand, we examined: (i) coefficient of variance (CV = standard deviation/mean) of the entitlement rates in 2002 and 2005; and (ii) the relationship between the prefecture-specific entitlement rate in 2002 (baseline rate) and the increase in entitlement rate from 2002 to 2005. The former analysis was performed to determine the change in variation: equalization of the LTC services might lead to a decline in CV. The latter analysis was based on the hypothesis that prefectures with a lower baseline rate showed the greater increase, as regional differences in the rate were lessening due to equalization of services.

Difference in rate increase between low and high care levels

We compared the increase in entitlement rate among care levels. LTC insurance specifies six care levels, comprised of “support” (least severe disability) and “levels I–V” in order of increasing disability.

First, the dimensions of the entitlement rates by care levels were examined by principle component analysis (PCA). PCA with varimax rotation was conducted for prefecture-specific rates by care levels in 2002 and 2005,

Table 1 Results of principle component analysis for entitlement rates by care levels for 2002 and 2005

Care level	2002		2005	
	Component 1	Component 2	Component 1	Component 2
Support (least severe)	-0.02	0.97	-0.16	0.90
Level I	0.32	0.92	0.37	0.85
Level II	0.87	0.32	0.80	0.48
Level III	0.90	0.12	0.88	0.24
Level IV	0.89	0.16	0.94	0.00
Level V (most severe)	0.74	-0.03	0.75	-0.10

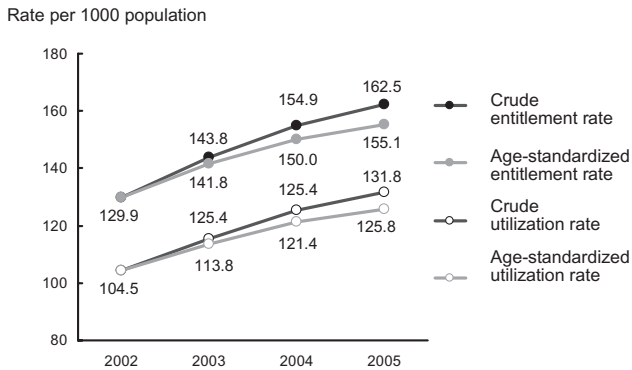


Figure 1 Trends in crude and age-adjusted entitlement and utilization rates of long-term care in Japan from 2002 to 2005. Age standardization was conducted using the 2002 population, and thus the crude and age-standardized rates in 2002 were equal.

and the results are shown in Table 1. Two components were obtained for both years: low care level and high care level. Based on the results of PCA, we calculated two aggregated rates of “support to level I” and “levels II–V”.

The increases in aggregated rates from 2002 to 2005 were then estimated, and the Spearman’s correlation coefficient between these increases was calculated. The increases in age-standardized entitlement rates of low and high care levels from 2002 to 2005 were compared using rate differences and rate ratios with paired Student’s *t*-tests. Statistical analyses were performed using SPSS ver. 15.0J (SPSS Software, Chicago, IL, USA).

Results

The trends in crude and age-standardized entitlement and utilization rates are shown in Figure 1. Both age-standardized entitlement and utilization rates increased steadily from 2002 to 2005, as did the crude rates. Table 2 shows care level-specific data for 2002 and 2005.

Figure 2 shows the trend in number of certified people from 2002 to 2005, in which the increase was

Table 2 Numbers and age-standardized rates of those certified as requiring long-term care (entitlement) and receiving insurance benefits (utilization) by care levels among the aged over 65 years in 2002 and 2005 in Japan

	2002		2005	
	Number (thousand)	‡Rate (/1000)	Number (thousand)	Rate‡ (/1000)
Entitlement				
All levels	3070	129.9	4112	155.1
Support	420	18.2	684	26.1
Level I	909	39.4	1324	50.4
Level II	566	24.5	605	23.0
Level III	394	17.1	528	20.0
Level IV	397	17.2	502	19.0
Level V	384	16.7	468	17.7
Utilization				
All levels	2469	104.5	3338	125.8
Support	280	12.1	548	17.4
Level I	705	30.6	1059	40.2
Level II	472	20.4	523	19.9
Level III	342	14.8	466	17.7
Level IV	347	15.0	445	16.8
Level V	322	14.0	388	14.7

‡Age-standardization of the rates was conducted using the national population of 2002.

classified into the proportions that were and were not due to population aging. The proportion due to population aging was 39.9% of the total increase from 2002 to 2005.

As an indicator of the variance, the CV of the entitlement rates among 47 prefectures changed from 0.12 in 2002 to 0.11 in 2005. The relationship between the entitlement rate in 2002 and its increase from 2002 to 2005 in 47 prefectures is shown in Figure 3. Prefecture A (Okinawa) had the highest rate in 2002, which then declined over the subsequent 3 years. The Spearman’s correlation coefficient between two variables was -0.196 (*P* = 0.19).

Figure 4 summarizes the age-standardized entitlement rates by care level in 47 prefectures in 2002 and

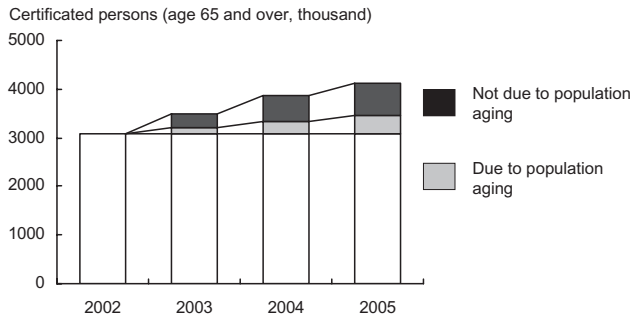


Figure 2 Trends in number of certified people, and classification into proportions that were and were not due to population aging from 2002 to 2005. The portion due to population aging was estimated using age-specific entitlement rates from 2002 and the population from 2003 to 2005.

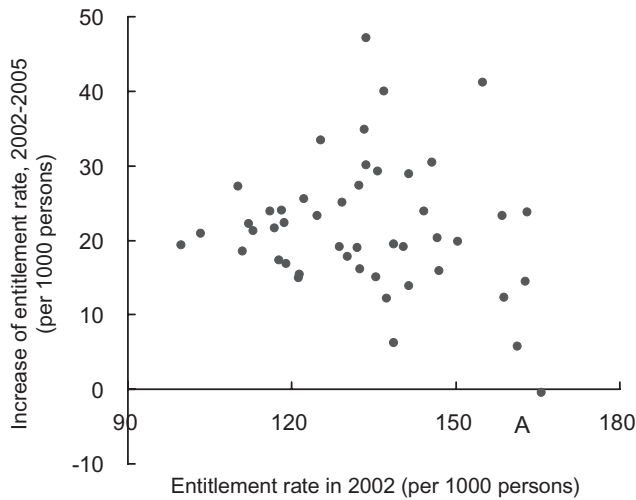


Figure 3 Relationship between entitlement rate in 2002 and rate increase from 2002 to 2005 in 47 prefectures in Japan.

2005, showing the average and spread. With the exception of level II, all levels showed statistically significant increases. Table 3 shows the age-standardized entitlement rates in 2002 and 2005 in 47 prefectures and their rate differences and rate ratios according to care level (low and high levels). The rate difference and rate ratio for low care levels (support and level I) were significantly larger than those for high care levels (level II–V).

The relations between rate increases in low and high care levels are shown in Figure 5. The variables showed a significant correlation (Spearman’s coefficient = 0.34, $P = 0.02$). Prefecture A (Okinawa) showed little increase in low or high level entitlement rates, while B (Nagasaki) and C (Akita) showed large increases in both levels. If these three cases are excluded, the correlation among 44 prefectures was weak and not significant (Spearman’s coefficient = 0.20, $P = 0.20$).

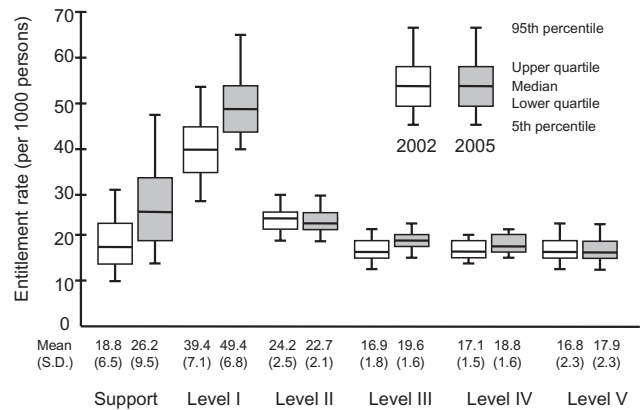


Figure 4 Changes in age-standardized entitlement rates by care level in 47 prefectures from 2002 to 2005.

Discussion

The increase in number of elderly people requiring LTC and the associated costs of these services are imposing an increasing burden on Japanese society. The Ministry of Health, Labor and Welfare estimated that the number of elderly people requiring LTC will increase from 1.5 million in 2000 to 5.2 million by 2025.¹⁶ This increase in LTC demand will jeopardize not only LTC insurance but also Japanese society itself.

However, if the increase in number of elderly people requiring LTC services is the result of population aging, society should bear these costs. On the other hand, increases due to other factors, including socioeconomic context, may be preventable by various means. There has been a marked increase in medical care expenditure in Japan since the introduction of the medical care service system for the elderly in the 1970s.¹⁷ This expanding health expenditure has had a deleterious effect on Japanese society. Detailed discussion from this viewpoint will aid in policy decisions and may slow or reverse the increase in LTC demand.

The present study was performed to examine three possible explanations for the increase in number of people certified to receive care under the LTC insurance program. However, our findings refuted the validity of these postulated explanations.

First, although the influence of population aging on the increase in LTC demand was substantial, it could not be sufficiently explained by this mechanism: approximately two-thirds of the increase could not be explained by the effect of population aging.

Second, the increase in LTC demand was unlikely to be due to equalization of geographical variations. One prefecture, Okinawa (A in Fig. 3), showed a decline in entitlement rate in the context of the highest rate at baseline. However, for the country as a whole, the baseline rate (in 2002) was not related to further increases

Table 3 Comparisons of rate difference and rate ratio of age-standardized entitlement rate in 2002 and 2005 in 47 prefectures

Indicator	Care level		P-value
	Low (support and level I)	High (level II–V)	
Rate of 2002 (/1000)	58.2 ± 13.0	75.1 ± 6.8	
Rate of 2005 (/1000)	75.6 ± 14.6	79.3 ± 6.6	
[†] Rate difference (/1000)	17.4 ± 6.7	4.2 ± 3.4	<0.001
[‡] Rate ratio	1.31 ± 0.12	1.06 ± 0.05	<0.001

Figures represent means ± SD. Age-standardization was conducted using the national population in 2002. P-values were estimated by paired Student's *t*-test. [†]Rate difference = (rate of 2005) – (rate of 2002). [‡]Rate ratio = (rate of 2005)/(rate of 2002).

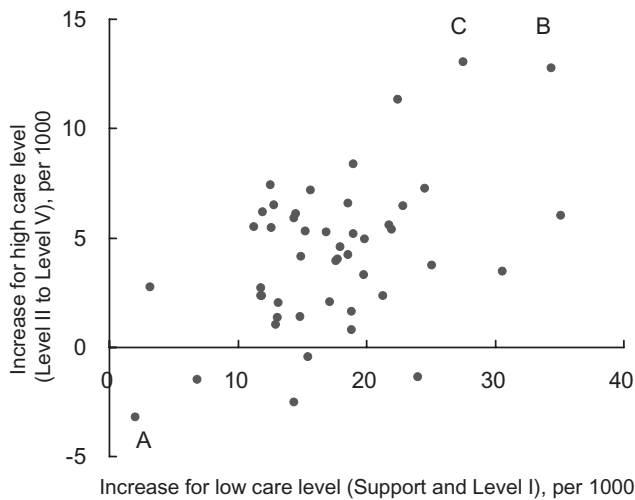


Figure 5 Relationship between increases in age-standardized entitlement rates of low care level (“support and level I”) and high care level (“level II–V”) from 2002 to 2005. The Spearman’s correlation coefficient is 0.34 ($P = 0.02$) for all cases and 0.20 ($P = 0.20$) when A, B and C are excluded.

(from 2002 to 2005) in the entitlement rate, and the geographical variation did not diminish (CV was 0.12 and 0.11 in 2002 and 2005, respectively).

The third possible explanation for the increase in LTC demand, that it is dependent on a general deterioration in the health of the elderly population, was not supported by the data. If the general deterioration increased LTC demand, entitlement and utilization rates would increase across all care levels or for the high care level to a greater extent than the low care level. Our analysis of national level data showed the opposite findings. In analysis of the prefectural level data, Figure 4 and Table 3 show that the increase in entitlement rate for low care level was larger than that for high care level, and that the increases in low and high care levels did not increase in parallel. However, a few prefectures (e.g. B and C in Fig. 4) showed notable increases in both care levels. Further detailed studies of these cases will eluci-

date the factors contributing to LTC demand that are unique to selected cases and that are common throughout the country.

Another possible explanation for the increase in LTC demand is the transition from medical care services to LTC services. Governmental policy has been attempting to control national medical expenditure, and increases in national medical expenditure slowed down after the introduction of LTC insurance.¹ Medical expenditure for the elderly decreased from 1999 to 2001, with Okinawa prefecture, which had the highest entitlement rate, showing the most marked decrease in medical expenditure.¹⁸ Further studies are needed to determine the relationship between the decrease in medical expenditure and the increase in LTC demand, and the social advantages of the transition from medical to nursing care.

As one of the limitations of this study, we did not explore the relationships between LTC demand and possible correlates, such as socioeconomic and cultural factors. Several previous studies addressing geographical differences suggested that socioeconomic factors are related not only to health indicators but also to health service utilization.^{3–6,19–22} Such approaches will aid in determining possible factors related to the increase in LTC entitlement rate. Interestingly, the results of the present study indicated a larger increase in the age-standardized entitlement rate in the low care level as compared to that in the high care level. This finding implies that there are some specific factors underlying of the increase in low care level (support and level I), including socioeconomic and cultural factors.

The effects of economic factors should also be acknowledged. It has been reported that most institutions and businesses related to LTC face difficulties in their operation.²³ Most such care facilities employ care managers, who should be neutral with regard to care recipients and providers, to facilitate better running, and it appears that these facilities attempt to restrict the recipients of their services.^{23,24} As care workers in LTC receive insufficient rewards for their efforts, there is a

high turnover rate with such workers frequently leaving their jobs.²³ Although the relationships between the economic and labor situation and increases in LTC demand are not clear, stable management of LTC, including good running of the relevant facilities and high job satisfaction among care workers, is required for sustainability of the LTC system.

In conclusion, we examined the influence of population aging, equalization of services and decreases in health level as possible explanations for the recent increases in LTC demand in Japan. The results refuted the possibility that these factors were responsible for the observed changes, and thus the increases in LTC demand during the study period could not be explained. The results of this study in which we applied simple epidemiological methods to routinely collected data regarding long-term care may have implications for future health policy.

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