

Table 1. Total life expectancy and expected years of life with care needs at age 65 by age group among Japanese men and women in 2005 and 2009

Sex	Age group (years)	2005		2009	
		Life expectancy (years)	Expected years with care needs (years)	Life expectancy (years)	Expected years with care needs (years)
Men	65–69	4.82	0.09 (1.8)	4.83	0.09 (1.8)
	70–74	4.35	0.16 (3.7)	4.41	0.16 (3.7)
	75–79	3.65	0.24 (6.5)	3.78	0.26 (6.8)
	80–84	2.71	0.30 (11.3)	2.89	0.35 (12.1)
	85+	2.58	0.64 (24.8)	2.96	0.77 (25.9)
	Total	18.11	1.43 (7.9)	18.88	1.62 (8.6)
Women	65–69	4.92	0.07 (1.3)	4.93	0.07 (1.3)
	70–74	4.71	0.14 (3.0)	4.75	0.14 (3.0)
	75–79	4.36	0.28 (6.5)	4.44	0.31 (6.9)
	80–84	3.78	0.54 (14.4)	3.91	0.59 (15.0)
	85+	5.38	1.96 (36.4)	5.95	2.34 (39.4)
	Total	23.16	2.99 (12.9)	23.97	3.44 (14.4)

Number of expected years with care needs as a proportion of life expectancy is shown as a percentage in parentheses.

Expected years with care needs in 2009 (years)

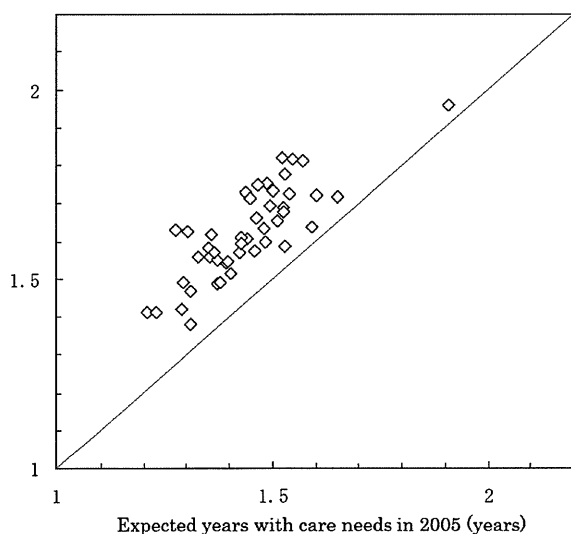


Figure 2. Expected number of years with care needs at age 65 among men for all Japanese prefectures in 2005 and 2009

Expected years with care needs in 2009 (years)

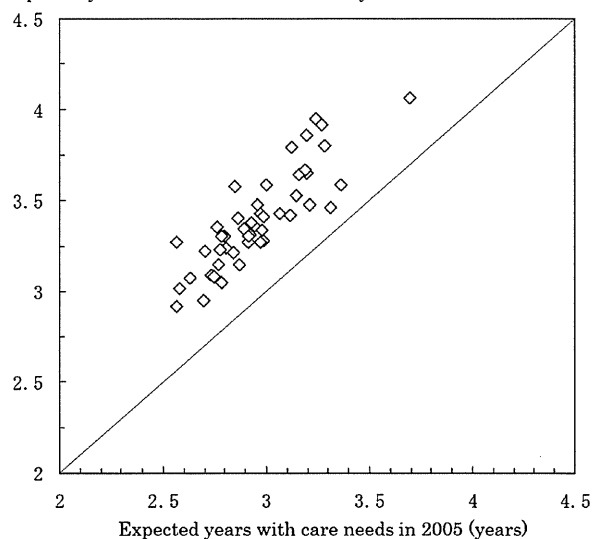


Figure 3. Expected number of years with care needs at age 65 among women for all Japanese prefectures in 2005 and 2009

men and women increased in every prefecture from 2005 to 2009. Number of expected years with care needs in 2009 between 47 prefectures ranged from 1.38 to 1.96 among men and from 2.92 to 4.06 among women.

Table 2 shows prefectural distributions of total life expectancy and expected years with care needs at age 65 years among men and women in 2005 and 2009. The 25th and 75th percentiles of expected years with care needs at age 65 years were 1.36 and 1.52 years, respectively, for men in 2005. The difference between these percentiles was 0.16 years for men and 0.35 years for women in 2005, and 0.16 years for men and 0.32 years for women in 2009.

DISCUSSION

Expected years of life with care needs at age 65 years increased in 2005–2009, as did the proportion of those years to total life expectancy. These results indicate that the duration of senior life with disabilities increased in the Japanese population. An increase in the number of expected years of life with a light or moderate disability to total life (ie, including younger lives) was reported for 1995–2004 in the Japanese population.⁸ Prolongation of expected years with disability has been reported in some countries, while a decrease has been noted in others.^{3–6}

Table 2. Prefectural distributions of total life expectancy and expected years of life with care needs at age 65 for Japanese men and women in 2005 and 2009

Sex		Prefectural distribution in 2005			Prefectural distribution in 2009		
		Percentiles		Difference ^a	Percentiles		Difference ^a
		25th	75th		25th	75th	
Men	Life expectancy (years)	17.95	18.30	0.35	18.58	19.03	0.45
	Expected years with care needs (years)	1.36	1.52	0.16	1.55	1.71	0.16
Women	Life expectancy (years)	22.92	23.60	0.68	23.64	24.20	0.56
	Expected years with care needs (years)	2.78	3.14	0.35	3.23	3.55	0.32

^aDifference between 25th and 75th percentiles.

We observed temporal trends in expected years with care needs at age 65 by age group. Those years did not increase in 2005–2009 in the age groups of 65 to 69 and 70 to 74 years; however, they markedly increased in the age group of 85 years or older. Recently, life expectancy in the age groups of 65 to 69 and 70 to 74 years is very high in Japan.¹³ Because recent gains in expected years of total life were very small (Table 1), however, the absence of an increase in those with care needs in these age groups would not be surprising. Nevertheless, there were some gains in expected years of total life in the age group of 85 years or older. The gains in expected years of relatively older life (eg, age >90 years) would lead to an increase in those with care needs in the age group of 85 years or older.

Expected years of life with care needs at age 65 years increased in 2005–2009 in every prefecture. The differences between the 25th and 75th percentiles in prefectural distributions was 0.16 years for men and 0.35 years for women in 2005. Those differences remained virtually constant between 2005 and 2009. Disparities in expected years with care needs or disability by geographic area have been reported in several reports.^{3,11,12,21,22}

There are many factors related to mortality and care needs in elderly people. Correspondingly, many factors influence temporal trends and prefectural differences in expected years with care needs observed in the present study. There have been influential studies of these factors that used correlation analysis of prefectural data in Japan. One report found that, among 181 factors related to demographic, socioeconomic status, health status and behavior, medical environment, social relationships, climate, and other areas, 3 factors were associated with long disability-free life expectancy: good self-reported health status, a high proportion of older workers, and the presence of a large number of public health nurses.²³ Another report observed that expected years with disability at age 65 years was negatively correlated with the rate of elderly adults living with a son or daughter (among men), the residential capacity of institutes for the elderly (among women), and the availability of care services (among men and women).²⁴ A third study reported that disability-adjusted life expectancy at age 65 years was correlated with the

overall unemployment rate.²⁵ Other, similar ecological studies found that disability-free life expectancy was associated with illiteracy rate and the proportion of smokers (in Spain), with social class (in England), and with economic status (in China).^{22,26,27} Prospective studies of persons aged 65 years or older indicated that active life expectancy was associated with level of education, smoking status, and physical activity.^{28,29} These findings confirmed that several factors, including socioeconomic status, are related to temporal trends and prefectural differences in expected years with care needs, as observed in the present study. Further studies of determinants are warranted.

There were some limitations and problems in the present study. We used Japanese long-term care insurance data, which have been used to estimate disability-free life expectancy in several studies.^{10–12,30} Our findings could be affected by changes in the long-term care insurance system. Increased insurance coverage of care needs would lead to incorrect higher estimates of expected years with care needs. However, it was reported that applications for insurance rapidly improved during the first 3 years after introduction of the system and that coverage of care needs in a ward in Sendai City in 2002 was nearly complete.³¹ The coverage of care needs in 2005 should therefore be sufficiently high and stable to accurately estimate expected years with care needs of elderly adults in Japan.¹¹ The insurance system underwent a major change when new preventive benefits were introduced in 2006.¹⁵ The goal of these benefits is to prevent seniors from becoming dependent. However, the target includes only seniors with lesser needs, not those with a care need level of 2 or more, ie, those who were classified as having care needs in our study. Information on coverage of care needs under the insurance system would not be sufficient for appropriate evaluation of temporal trends in expected years with care needs.

We used actual numbers of persons with care needs from the *Report on Long-Term Care Insurance Services* and sex- and age-specific proportions of approximate numbers of persons with care needs from the *Survey of Long-term Care Benefit Expenditures*.^{14,18} When using only those approximate numbers, as in another study, expected years with care needs at age 65 slightly changed¹¹: 1.44 years for men and 3.03

years for women in 2005, and 1.65 years for men and 3.49 years for women in 2009 (the respective values in Table 1 were 1.43, 2.99, 1.62, and 3.44 years).

As required by the previously developed method used in the present study, we classified care need levels of 2 or higher as having care needs, and other levels as having no care needs.¹¹ A previous report indicated that many public health workers had accepted this classification for calculating expected years of life with and without care needs.³² In addition, we used the Sullivan method for calculating expected years with care needs. Although it is assumed that age-specific prevalence of care needs in the stationary population is equivalent to that in the real population, this method is a common tool for estimating disability-free life expectancy based on cross-sectional data on disability.^{3,19} Life-table data for all of Japan were available.¹³ Life tables in prefectures were constructed using Chiang's method, based on prefectural death rates. Chiang's method is a standard technique for constructing an abridged life table.^{11,20} We observed expected years with care needs in 2005–2009. When evaluating such trends, a longer observation period might be more useful. We hope that future reports of official statistics will include such information on expected years with care needs.

In conclusion, expected years of life with care needs increased among Japanese from 2005 to 2009, although there was a wide range in prefectural distributions. Further studies on coverage of care needs under the long-term insurance program are necessary to confirm these findings.

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Conflicts of interest: None declared.

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