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FACTORS ASSOCIATED WITH DECREASING PREVALENCE OF DEMENTIA IN THE COMMUNITY-DWELLING ELDERLY IN SUBURBAN TOKYO

Abstract:

Yamamoto's previous study showed that the prevalence of dementia in the community-dwelling elderly of 65 years and older in City A of Tokyo was decreasing during a six-year follow-up 2001-2007, suggesting that there should be some factors specific to City A. The purpose of this study is to clarify City A's specific factors in decreasing prevalence of dementia. Health status of the analysis subjects was examined in terms of ratios of approval for long-term care insurance, proportions of the elderly who had a family dentist, habits of smoking and alcohol intake, educational attainment (years of education) and interest in health issues. The analysis results were discussed reviewing official statistics and the results of previous studies. The analysis subjects showed lower ratio of approval for long-term care insurance than City A's and National statistics. More than 70% of them had a family dentist even in 2001. Proportions of smokers in male analysis subjects were decreasing over years. As for educational attainment, 38.9% had more than 13 years of education and 24.7% had more than 16 years in the 2004 survey. The higher educational attainment, interest in health and health literacy observed in the analysis subjects seem to have been specific factors which might have promoted their health status and contributed to decreasing the prevalence of dementia. Education might be a key to decrease the prevalence of dementia.

Keywords:

prevalence of dementia; long-term care insurance; family dentist; smoking; alcohol intake; educational attainment; health literacy.

JEL Classification: I19

1. Introduction

The World Health Organization and Alzheimer's Disease International jointly reported "Dementia: a public health priority" in 2012 to raise awareness of dementia as a public health priority, to articulate a public health approach and to advocate for action at international and national levels. The United Kingdom hosted the G8 Dementia Summit for the first time in London on December 11, 2013 at the occasion of hosting the G8 Summit 2013. The invited Health Ministers discussed how to shape an effective international response to dementia and agreed to commit themselves mainly to setting an ambition to identify a cure or a disease-modifying therapy for dementia by 2025 (G8 DEMENTIA SUMMIT DECLARATION, 2013).

Dementia gives an enormous burden and impact on countries. There were an estimated 44.4 million people with dementia worldwide in 2013 and the number will increase to an estimated 75.6 million in 2030 and 135.5 million in 2050. The total estimated worldwide cost of dementia was US$604 billion in 2010. Costs are expected to increase unless therapies/medicine to delay or prevent the onset of dementia is developed. Much of the increase will be in developing countries. In 2013, 62% of people with dementia live in low and middle income countries. The figure will rise to 71% by 2050. The world population has a greater proportion of older people to whom dementia mainly affects, but high income countries will have less increase in proportions of people with dementia (Alzheimer's Disease International, 2015).

The successes of improved health care in high income countries have increased the number of the older people. Many of them are living longer than before. Japan has been enjoying great longevity, whose life expectancy at birth was 80.50 in men and 86.83 in women in 2014（Ministry of Health, Labour and Welfare, 2014）. It will further extend to 83.55 and 90.29 in men and women, respectively, in 2050. The ageing rate was 25.1% in 2013 and is estimated to rise to 38.9% in 2050（Cabinet Office, Government of Japan, 2013）. Asada et al. (2013) projected that the number of people with dementia was 4.62 million in 2012 and the prevalence of dementia of the elderly of 65 years and older was 15% in Japan.

Since early detection and implementation of treatment are essential, the Japanese government initiated more effective measures to make dementia friendly communities and implemented the notable program entitled "Nationwide Caravan to Train One Million Dementia Supporters" in 2005. Under these measures, local governments (municipalities) have been providing lectures on preventing dementia, promoting understanding of early symptoms and training dementia supporters in communities over the past years. They attained the initial goal of one million in May 2009 (Nationwide Caravan to Train One Million Dementia Supporters, 2009). At the end of March 2014, the number of supporters

reached 4.99 million (Community Care Policy Network, 2014) and is planned to increase up to 10 million by 2025.

Speaking of addressing with the issue of dementia before 2005, Japanese local governmnets conducted forty-five sample surveys from 1956 to 2001 on the prevalence of dementia. The number of subjects varied from 497 in Miyagi Tajiri town in the eastern part of Japan in 1998 to 9,274 in Hokkaido in the northern part in 1986. The prevalence ranged from 3.0% to 8.8% (Nakamura et al., 2004) and no particular tendency of increasing or decreasing could be observed. It might be partly because there were not many programs and measures against dementia initiated by local governments before 2001. Yamamoto and Hoshi (2012) reported that the prevalence of dementia in City A, which is in the suburbs of Tokyo metropolis, is steadily decreasing during a 6-year follow-up from 9.7% in 2001, 7.8% in 2004 and to 7.4% in 2007. Results are based on the complete surveys of the community-dwelling elderly of 65 years and older. Some may simply argue that it is due to institutionalization of persons with a dementia status. However, institutionalized ones are excluded from the subject elderly in their study.

Reviewing the policies addressed with by City A, the Fourth Comprehensive Plan of City A, which covers the years of 2001-2010, describes an importance to take a measure for an ageing society with a declining birthrate. The Fifth Comprehensive Plan, implementing in the year of 2011, clearly describes that the City plans to promote infrastructures such as a nursing home for the elderly, a so-called group home for persons with dementia, and a care service system (Health and Welfare Plan for the Elderly, 2012). In City A there were only four nursing homes in 2011 and the number of group homes was only six in 2012 including the ones under consideration. The number of people with dementia under long-term care insurance was 2.8 million as in September 2010 and a half of them were being institutionalized or hospitalized and another half dwelling in communities (Health and Welfare Bureau for the Elderly, 2010a). We can easily guess that during the follow-up years 2001-2007 of Yamamoto and Hoshi (2012) there were less number of nursing and group homes not only in City A but also in other cities. Thus, institutionalization does not seem to be a major cause of decreasing prevalence of dementia. Yamamoto's previous study (2015) suggested that there should be some factors specific to City A. The purpose of this study is to clarify them by examining subjects' lifestyle and socio-economic backgrounds.

2. Methods

2.1 Baseline data

Baseline data were based on the 2001 Complete Survey of the Community-dwelling Elderly of 65 Years and Older. Self-administered questionnaires were mailed to all of the subject elderly. Institutionalized ones were excluded. Responses were returned by mail by the addressees themselves or by proxies when the addressees were unable to

respond for some reasons such as absence, being hospitalized, cognitive impairment or a dementia status. Response rate was 80.2%. Questionnaires consisted of 44 items such as fundamental attributes, respondents (addressee him- or herself, or proxy), family members, self-perceived health, activities of daily living, instrumental activities of daily living, lifestyle, family physician and dentist, long-term care insurance, a socio-economic status, and others. As Table 1 shows, the number of analysis subjects was 13,058, among which 11,529 addressees responded by themselves and 1,529 by proxies who were all family caregivers. Persons with dementia (PWD) in the 2001 Survey were those whose dementia status was perceived and reported by proxies. Others were defined as non-dementia persons (NDP). The number of PWD was 239. Mean age (standard deviation; SD) was 80.6 (9.2) in men and 84.7 (7.7) in women in PWD, and 72.0 (6.1) and 73.1 (6.7) in men and women, respectively, in NDP.

Table 1. Demographic characteristics of analysis subjects

	2001			2004			2007		
	men	women	Total	men	women	Total	men	women	Total
Analysis subjects (n)	6,010	7,048	13,058	6,235	6,947	13,182	7,081	8,003	15,084
Addressees	5,450	6,079	11,529	5,889	6,244	12,133	6,719	7,360	14,079
Family proxies	560	969	1,529	346	703	1,049	362	643	1,005
Proxy- or self-reported dementiasStatus									
Persons with dementia (n)	67	172	239	76	192	268	128	248	376
mean age (standard deviations)	80.6 (9.2)	84.7 (7.7)	–	78.6 (8.4)	85.1 (7.1)	–	78.9 (8.0)	84.5 (6.9)	–
Non-dementia persons (n)	5,943	6,875	12,818	6,159	6,755	12,914	6,953	7,755	14,708
mean age (standard deviations)	72.0 (6.1)	73.1 (6.7)	–	72.1 (6.0)	73.2 (6.7)	–	72.5 (6.0)	73.3 (6.6)	–

2.2 Follow-up data

Follow-up data were collected in 2004 and 2007. Self-administered questionnaires were mailed, which consisted of the almost same items as in the 2001 Survey, however, in the 2004 and 2007 Surveys an item to ask diseases including dementia under treatment was provided, and so PWD included those who reported their own dementia status under treatment in addition to those whose dementia status was perceived and reported by proxies. An item to ask years of education was also provided.

In the 2004 Survey (response rate, 64.3%), the number of analysis subjects was 13,182, among which 12,133 addressees responded by themselves and 1,049 by proxies. The number of PWD was 268. Mean age (SD) was 78.6 (8.4) in men and 85.1 (7.1) in women in PWD, and 72.1 (6.0) and 73.2 (6.7) in men and women, respectively, in NDP. In the 2007 Survey (response rate, 60.9%), the number of analysis subjects was 15,084, among which 14,079 addressees responded by themselves and 1,005 by proxies. The number of PWD was 376. Mean age (SD) was 78.9 (8.0) in men and 84.5 (6.9) in women in PWD, and 72.5 (6.0) and 73.3 (6.6) in men and women, respectively, in NDP (See Table 1).

2.3 Outlines of City A

City A locates in the suburbs of Tokyo metropolis and a distance of 40-50 minutes' train ride from Shinjuku, a sub-center of Tokyo. According to the 2005 Census, which was taken close to our survey years, it had a population of 146,000, and consisted of 62.9 thousand households. The largest proportion, 80.0%, worked in the tertiary industry, the service industry, about 58% worked in information technology, medicine, care and welfare service, education including supplementary private schools, government and local offices, and other professions that were difficult to classify.

The ageing rate in 2005 was 15.8%, which was lower than national average of 20.2%. City A was possibly a younger city in metropolitan Tokyo. It was probably because approximately 60% of the population lived in the so-called New Town, among which population aged 45 to 54 years occupied the largest proportion (Nissei Basic Research Institute, 1998). The ageing rate rose to 22.8% as of October 1, 2012, while national average was 24.1%. A disparity had narrowed greatly and City A has been ageing rapidly since 2005.

2.4 Analytical methods

2.4.1 Calculation of prevalence of dementia

The previous study of Yamamoto and Hoshi (2010) clarified that the persons with lower-scoring cognitive capacities in NDP are those whose dementia status is overlooked. The details are described in previous reports (Yamamoto and Hoshi, 2010, 2011), however, in brief, cognitive scores are measured by three cognitive capacities: 1) banking and/or withdrawing, 2) filling out forms/documents such as pensions, and 3) reading books/newspapers. The odds ratios of these capacities to a dementia status are shown to be high by multiple logistic regression analysis (Yamamoto and Hoshi, 2008). One point was allocated to a positive answer and the scores ranged from 0 to 3 points. Areas under the receiver operator characteristic curves were calculated. The cut-off point is 0-1/2-3. The 0-1 scoring group is defined as the lower-scoring group (LSG) of cognitive capacities. The subjects who answered all three of them are included in the analyses. The ratios of LSG in NDP are calculated as the proportion of overlooked dementia. The prevalence of dementia is calculated by the sum of proportions of PWD and proportions of LSG in NDP (Yamamoto, 2015).

The prevalence of dementia in the three surveys are calculated (Yamamoto, 2015). Analysis subjects are those who answered all the three cognitive capacities. They are 12,687, 12,553 and 14,532 in 2001, 2004 and 2007, respectively. Among them the numbers of PWD are 232, 254 and 376, and the numbers of LSG in NDP were 997, 721 and 706 in the same order. Proportions of PWD are 1.8% in 2001, 2.0% in 2004 and 2.6% in 2007. Those of LSG in NDP are 7.8%, 5.7% and 4.9% in 2001, 2004 and 2007,

respectively. Thus, prevalence of dementia is 9.7% in 2001, 7.8% and 7.4% in 2004 and 2007, respectively. It is decreased from 9.7% to 7.4% during 6 years as shown in Table 2.

Table 2. Proportions of persons with dementia (PWD), and lower-scoring group (LSG) in non-dementia persons (NDP) and prevalence of dementia

		n	PWD n(%)	LSG in NDP n(%)	Prevalence of dementia n(%)
2001	Men	5,870	65(1.1)	366(6.2)	431(7.3)
	Women	6,817	167(2.4)	631(9.3)	798(11.7)
	Total	12,687	232(1.8)	997(7.8)	1,229(9.7)
2004	Men	5,979	72(1.2)	301(5.0)	373(6.2)
	Women	6,574	182(2.8)	420(6.4)	602(9.2)
	Total	12,553	254(2.0)	721(5.7)	975(7.8)
2007	Men	6,882	128(1.9)	274(4.0)	402(5.8)
	Women	7,650	248(3.2)	432(5.6)	680(8.9)
	Total	14,532	376(2.6)	706(4.9)	1,082(7.4)

Note: n is the number of analysis subjects who responded all three cognitive capacities (banking and/or withdrawing, filling out forms/document such as pensions, and reading books/newspapers) are included in analyses.

Source: Yamamoto C. (2015) Collected Treatises of Hamamatsu Gakuin University, 11(1): 13-20.

2.4.2 Other analytical methods

A health status and health behavior of the community-dwelling elderly over 65 years were examined in terms of ratios of approval for long-term care insurance, habits of smoking and alcohol intake, proportions of the elderly having a family dentist, educational attainment and interest in health issues. Analysis results are discussed comparing with the results of previous studies and City A's and the national statistics to clarify factors contributing to decreasing prevalence of dementia.

2.5 Ethical procedures

An agreement was made between City A and Tokyo Metropolitan University to protect personal data. The University Committee on Ethical Issues approved the surveys and studies. Individuals were all numbered without names, and an alternative "I don't want to answer." was provided, so that all respondents were assumed to have consented to the surveys.

3. Results and discussion

3.1 Ratios of approval for long-term care insurance

As Table 3 shows, the ratios of approval for long-term care insurance in PWD and NDP in the analysis results are 12.4% in 2001, 8.2% in 2004 and 8.2% in 2007. City A's statistics show 9.9%, 11.3% and 10.7% (Citizen's Committee on Evaluation of Tama City's Administrtion, 2010) and the national statistics show 12.4%, 15.7% and 15.9% (Health and Welfare Bureau for the Elderly, 2010b) in 2001, 2004 and 2007, respectively. They are statistics of 65 years and older like our analysis subjects. The ratios of this study are lower than City A's and the national statistics except in 2001. Since City A's official statistics include those who are institutionalized, it is understandable that the results of this study are lower. Even City A's official statistics are approximately 20% to 35% lower than the national statistics, i.e., the elderly of City A are healthier as a whole. The ratios of this study in 2004 and 2007 are the lowest among the three and almost half of the national statistics. The results of this study indicate that the analysis subjects are healthy on the whole.

Table 3. Ratios of approval for long-term care insurance: analysis results, City A's official statistics and National statistics

		Analysis subjects	PWD	NDP	Total approved n(%)	Analysis results	City A's statistics	National statistics
2001	Men	6,010	43	557	600(10.0)			
	Women	7,048	127	888	1,015(14.4)	12.4%	9.9%	12.4%
	Total	13,058	170	1,445	1,615(12.4)			
2004	Men	6,235	41	333	374(6.0)			
	Women	6,947	123	584	707(10.2)	8.2%	11.3%	15.7%
	Total	13,182	164	917	1,081(8.2)			
2007	Men	7,081	90	381	471(6.7)			
	Women	8,003	186	577	763(9.5)	8.2%	10.7%	15.9%
	Total	15,084	276	958	1,234(8.2)			

Note: City A's statistics are based on the Statistics of B-1 Long-term Care Insurance Promoting Project: 2010.
National statistics are based on the Annual Report on Long-term Care Insurance: 2010.

3.2 Proportions of the elderly having a family dentist, habits of smoking and alcohol intake, educational attainment and interest in health issues

3.2.1 Family dentist

The proportions of the elderly who had a family dentist were 70.3% in 2001 and 70.0% in 2007, which suggests that the analysis subjects were highly concerned with dental oral health (see Table 4).

Yamamoto T. et al. (2012) followed up 4,425 healthy elderly people over 65 years old from 2003 to 2007. Among them the number of persons with dementia under long-term

care insurance is 220 (5.0%). The survey indicated that elderly people who had no family dentist have a risk of the onset of dementia 1.4 times as much as those who had one. The elderly who had few teeth without dentures have a risk of the onset of dementia 1.9 times as much as those who had more than 20 teeth of their own. Our data of City A cover the period from 2001 to 2007 which was almost the same period as the above survey. We provided no items to ask the number of their own teeth. However, the result that more than 70% of the analysis subjects had a family dentist even in 2001 suggests that they are more concerned with dental oral health, probably followed by oral health behavior which might have contributed to decreasing the prevalence of dementia.

3.2.2 Habit of smoking

The proportions of smokers in the analysis subjects were 27.8% in men and 7.3% in women in 2001, 23.6% in men and 5.9% in women in 2004, and 20.2% and 5.5% in men and women, respectively, in 2007. They were clearly decreasing over years (see Table 4).

The National Health and Nutrition Survey (Ministry of Health, Labour and Welfare, 2013) shows the changes in proportions of male smokers; 35.9% in the 60s and 29.0% over 70 years in 2001, 33.3% and 24.0% in the 60s and over 70 years, respectively, in 2004, and 32.8% and 18.6% in the same order in 2007. To make the comparison clearer, we calculated the proportions of the male smokers over 70 years in City A. They were 24.5%, 20.2% and 17.3% in 2001, 2004 and 2007, respectively. They were 15.5%, 15.8% and 7.0% lower than those of the national statistics in 2001, 2004 and 2007, respectively (see Table 4).

The previous studies have shown an association of smoking with dementia. Rusanen et al. (2011) analyzed prospective data from a multiethnic population-based cohort of 21,123 members of a health care system who participated in a survey between 1978 and 1985 and collected diagnosis of dementia, Alzheimer‘s disease (AD), and vascular dementia (VaD) from January 1994 to July 2008. As a result, 25.4% of 5,367 persons are diagnosed as having dementia during a mean follow-up period of 23 years. After adjusting for 13 factors such as age, sex, education, race, hypertension, body mass index and diabetes, they concluded that heavy smoking in midlife is associated with a greater than 100% increase in risk of dementia, AD and VaD more than 2 decades later. Severine et al. (2012) analyzed data from 5,099 men and 2,138 women in the Whitehall II study. They reported that, compared with never smokers, middle-aged male smokers experience faster cognitive decline in global cognition and executive function, and that there are no adverse effects on cognitive decline in ex-smokers with at least a 10-year cessation. Lower ratios of male smokers in late years in City A imply less smoking habit in their earlier days and better health status in late years.

3.2.3 Habit of alcohol intake

Since questionnaires of this study did not provide an item to ask amount of alcohol intake, drinkers were defined as persons drinking 3-4 times a week to almost every day. The proportions of drinkers over 65 years were 45.4% in men and 8.5% in women in 2001, 50.3% and 12.6% in men and women, respectively, in 2004, and 47.8% and 11.1% in the same order in 2007 (see Table 4). For convenience of comparing with the National Survey in the below, we calculated the proportions of the drinkers over 70-year analysis subjects. They were 40.3% in men and 7.3% in women in 2001, 44.3% and 10.5% in men and women, respectively, in 2004, and 43.1% and 9.6% in the same order in 2007.

The 2002 National Nutrition Survey (Health Service Bureau, 2001) defines alcohol intake of drinkekrs as intake of 20 grams of absolute alcohol, which is equivalent of 500ml of beer or 200ml of wine, for more than three times a week and shows that the proportions of drinkers in the 60s are 55.1% in men and 7.3% in women and those of the elderly over 70 years are 45.4% in men and 2.7% in women. Providing no item to ask amount of alcohol intake in our three surveys, rigid comparison is not possible, however, comparing to the 2002 National Survey the male analysis subjects over 70 years implied less intake but not much difference and the female ones might have had a little more.

Neafsey et al. (2011) reviewed 143 papers that describe the relationship between moderate drinking of alcohol and some aspect of cognition. They reported that the average ratio of cognitive risk (dementia or cognitive impairment and/or decline) associated with moderate “social” (not alcoholic) drinking of alcohol is 0.77, with nondrinkers as the reference group, and that the benefit of moderate drinking applies to all forms of dementia (dementia unspecified, AD and VaD) and to cognitive impairment (low test scores). Our analysis subjects were neither nondrinkers nor drinkers of too much alcohol intake, which might be a good factor of the less prevalence of dementia.

3.2.4 Educational attainment

Items to ask educational attainment (years of education) were available in the 2004 and 2007 Surveys, however, the same alternatives for years of education were not necessarily provided in them. In the 2004 Survey 40.1% (27.7% in men and 51.7% in women) of the analysis subjects have 10-12 years of education and 38.9% (54.7% in men and 24.2% in women) have more than 13 years. In the 2007 Survey 44.4% (30.0% in men and 58.7% in women) have 10-12 years and 33.2% (50.6% in men and 15.9% in women) more than 13 years. Limiting to the proportion to more than 16 years of education, in other words the proportion of those who finished college/university, with some of whom attended graduate school, it is 24.7% (44.2% in men and 6.4% in women) in the 2004 Survey (see Table 4).

Table 4. Family dentist, habits of smoking & alcohol intake and years of education

	2001		2004		2007	
	men	women	men	women	men	women
Fasmily dentist, n(%)	3,874(69.5)	4,508(71.0)	–	–	4,582(66.7)	5,594(73.0)
Habit of smoking						
65 years & older, n(%)	1,488(27.8)	422(7.3)	1,347(23.6)	392(5.9)	1,335(20.2)	392(5.5)
70years & older, n(%)	817(24.5)	–	707(20.2)	–	761(17.3)	–
Habit of alcohol intake, 3-4 times and more/week						
6 5 years & older, n(%)	2,655(45.4)	566(8.5)	2,922(50.3)	791(12.6)	3,322(47.8)	860(11.1)
70 years & older, n(%)	1,333(40.3)	305(7.3)	1,549(44.3)	431(10.5)	1,886(43.1)	490(9.6)
Years of education						
10-12 years, n(%)	–	–	1,529(27.7)	3,054(51.7)	1,898(30.0)	3,747(58.7)
more than 13 years, n(%)	–	–	3,017(54.7)	1,428(24.2)	3,205(50.6)	1,012(15.9)
more than 16 years, n(%)	–	–	2,438(44.2)	380(6.4)	–	–

Note: The results are based on the number of those who answered the items concerned.

According to the 2008 Statistical Abstract of Education, Science and Culture, the rate of enrollment in senior high school was 42.5% in 1950 and 51.5% in 1955 and that of enrollment in college/university was 10.1% in 1955 and 17.0% in 1965. These statistics approximately reflect proportions of students pursuing higher education in the same generations as the analysis subjects. For example, those who enrolled in senior high school in 1950 were 69-70 years in 2004, our survey year, and those who enrolled in college/university in 1955 were 67-68 years in 2004. Japan's School Education Law was legislated in 1947 and established the education system of 6-year for primary school, 3-year each for junior and senior high schools and 4-year for college/university. According to changes in rates of going on to higher education in Japan, ratios of enrollment in college/university including junior college were 30.3% (34.6% in men and 17.2% in women) in 1950, and then decreased to 18.4% (20.9% and 14.9% in men and women, respectively) in 1955, with the lowest ratio 16.1% (18.2% and 13.3% in the same order) in 1957 (Postwar History of Showa Era: 1950-2003). Comparing to the 1950-1957 statistics above, ratios of more than 16 years of education in our analysis subjects are higher, with male analysis subjects showing 2.4-2.7 times higher.

Highly educated persons may have a greater cognitive reserve that can postpone the clinical manifestation of dementia (Ngandu et al., 2007). Better education may be one of environmental factors of prevalence rates of dementia being declined (Sachdev, 2014). Reviewing the current published evidence on the prevalence of dementia over the past twenty years, Langa reported that at least 5 recent population-based studies of dementia incidence or prevalence show a declining age-specific risk in the United States, Rotterdam, Stockholm and England and suggested that the prevalence of dementia might be declining in high income countries as the result of improvement in two key factors associated with dementia: levels of education and more aggressive treatment of key cardiovascular risk factors such as hypertension and hypercholesterolemia, which might

be leading to improving “brain health” and declining age-specific risk of AD and dementia (Langa, 2014; Alzheimer’s Disease International, 2014). Higher level of education shown in the analysis subjects might be a specific factor to City A, which suggests City A’s declining prevalence of dementia.

3.2.5 Interest in health issues and dementia

Health-related items were provided in the 2004 and 2007 Surveys, however, the same alternatives were not necessarily provided in them. The responses by proxies were excluded from the analyses. In the 2004 Survey health-related items were as follows: (1) Are you interested in articles and programs on health? (2) Do you think that disease can be prevented if you take care of yourself? (3) What kind of programs do you want your local government to provide? For the first question 93.0% of the analysis subjects responded “yes”. For the second one, 56.5% responded positively in the 2004 Survey. Respondents’ interest in health seemed to be high implying their health behavior to be followed. The third one was a multiple-choice question. In the 2004 Survey the proportion of those who chose “physical training to keep physical strength not to be a recipient of nursing care” was 29.7% in men and 27.8% in women, and 7.6% and 9.6% in men and women, respectively, preferred a learning program on dementia. In the 2007 Survey 2.2-2.5% preferred “physical training” and 3.1-3.3% “support of persons with dementia and their family caregivers” (see Table 5). The analysis subjects did not show much interest in learning dementia by themselves.

Table 5. Interest in health issues and dementia

	2004		2007	
Items	Men n(%)	Women n(%)	Men n(%)	Women n(%)
(1) Are you interested in articles and programs on health?	5,104(89.7)	5,792(96.2)	6,946(88.8)	7,831(94.4)
(2) Do you think that disease can be prevented if you take care of yourself?	3,244(57.9)	3,230(55.1)	–	–
(3) What kind of programs do you want your local government to provide? (Multiple-choices)				
Physical training to keep physical strength	1,749(29.7)	1,733(27.8)	158(2.2)	203(2.5)
Learning dementia	450(7.6)	600(9.6)	–	–
Support of persons with dementia and their family caregiver	–	–	233(3.3)	251(3.1)

Note: Mark "–" shows that no relevant choice was provided in the survey.
Responses by proxies were excluded from the analyses.

4. Concluding remarks

Our findings were, in brief, that the analysis subjects had high educational attainement, great interest in health issues and great concern in dental oral health with more than 70% having a family dentist. The male analysis subjects showed less proportion of smokers and a little less but not much difference in drinking over 70 years comparing with the

national statistics. These seem to have been specific factors to City A's elderly people, implying their health literacy being high enough to have promoted their health status as discussed above and contributed to decreasing the prevalence of dementia during a six-year follow-up.

Educational attainment and health literacy might be essential factors of making a good state of health. In Healthy People 2020 (2010) it is described that health literacy efforts must target at least K12 education, adult education, medical education and continuing medical education. K12 stands for education at kindergarten and 12 years from primary school to graduating from high school. Enrollment rate in compulsory education (primary school and junior high school) in Japan is 100% and 98.1% in senior high school in 2008 (Ministry of Education, Culture, Sports, Science and Technology, 2011). It will be easier for Japan to address dementia education as a school program, and many primary schools have been already introducing the Dementia Supporters Program into a part of their curriculum.

Higher education is still difficult for people in developing regions, with 126 million youth aged 15 to 24 worldwide lack basic reading and writing skills, of which 60% were women (United Nations Millennium Development Goals, 2000), however, enrollment in primary education in developing regions reached 91% of primary-school-age children in 2011 up from 82% in 1999 (UNICEF Data). Focusing primary school children and giving them learning programs on health promotion and dementia might be a small step to begin with. However, it will give next generations tools to fight disease, contribute to promote health in their adulthood, hopefully delay or prevent the onset of dementia and make quality life of their elderly age.

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