An analysis of factors related to disability-free life expectancy at 65 years of age across Japanese prefectures in 2010

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Abstract Compared to the large volume of research focused on mortality differentials within Japan, relatively little is known about regional variations in health expectancy, particularly among older people. This article has two interrelated objectives. The first objective is to estimate prefecture-specific disability-free life expectancy (DFLE) at 65 years of age in 2010. DFLE at 65 by gender and prefecture was computed using the Sullivan method, which was applied to prefecture-specific life tables and prevalence of disability from *Kokumin Seikatsu Kiso Chosa* (Comprehensive Survey of Living Conditions) of 2010. The second objective is to investigate macro-level factors associated with DFLE at 65 across 47 Japanese prefectures. Our results indicate regional disparities in DFLE at older ages. Importantly, we note close relationships between a prefecture's wealth, labor, and welfare characteristics and DFLE at 65. Income per capita, the proportion of workers older than 65, and welfare expenditures are positively related to DFLE, whereas unemployment and long-term care insurance expenditures per-capita are inversely associated with DFLE for both genders. The proportion of older adults relying on public assistance is negatively related only to women's DFLE. These results suggest that narrowing socioeconomic disparities may contribute to the health of Japanese elders. Reducing regional health disparities therefore requires policy makers to take into account the broader socioeconomic conditions of each prefecture.

Keywords Disability-free life expectancy · Mortality · Disability · Socioeconomic factors · Japan

Introduction

There is a considerable body of research on the exceptional health status of the Japanese people. Life expectancy (LE) at birth has increased by more than 20 years since the middle of the past century, reaching 80.79 years for men and 87.05 years for women in 2015 (Ministry of Health, Labor, and Welfare 2016). By 2060, LE at birth is projected to reach 84.2 years for men and 90.3 years for women (Cabinet Office, Government of Japan 2014). Further, the Japanese people not only live longer, but also enjoy healthier lives. In 2013, for instance, men and women in Japan had the longest healthy life expectancy (HLE) at birth in the world: They could expect to live 75 years in a healthy state, which was 13 years longer than the world average (World Health Organization 2015).

While the outstanding health of the Japanese population is widely recognized, a small but growing body of research alludes to health inequalities within the country. Particular attention is given to geographic disparities. In 2010, the gap in men's LE at birth was 3.60 years, ranging from 77.28 years in Aomori Prefecture to 80.88 years in Nagano Prefecture, whereas women's LE had a range of 1.84 years, from 85.34 years in Aomori Prefecture to 87.18 years in Nagano Prefecture (Ministry of Health, Labour, and Welfare 2014). An ecological study by Suzuki et al. (2012a) noted substantial prefecture-level variations in overall mortality rates, net of the age and occupation composition of each prefecture. Importantly, the magnitude of geographic inequalities in mortality has grown large over the past three decades (Suzuki et al. 2012b). Further, Robine

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et al. (2012) revealed differences in the probability of reaching age 100 across prefectures. In 2005, Okinawa Prefecture had by far the highest centenarian rate at age 70 (men 196 per 10,000 people aged 70; women 801) compared to the country's average values of 65 (for men) and 209 (for women). Taken together, these research findings illustrate substantial regional variations in mortality outcomes in Japan.

Compared to the large volume of research on mortality differentials, however, relatively little is known about regional variations in terms of health expectancy. Health expectancy measures were developed to assess the quality of life lived, because with the rapid increase in chronic conditions, people can have longer but less healthy lives (Reynolds 2008). Prior research on the health expectancy of the Japanese population has left two important questions unanswered. First, the estimates of health expectancy have thus far been limited. Data on disability-free life expectancy (DFLE) at birth, denoting the number of years spent without disability, are available for 47 prefectures. The most recent figures, for 2010, demonstrate that the gap in DFLE at birth was 2.79 years for men (from 68.95 years in Aomori Prefecture to 71.74 years in Aichi Prefecture) and 2.95 years for women (from 72.37 years in Shiga Prefecture to 75.32 years in Shizuoka Prefecture) (Ministry of Health, Labour, and Welfare 2014). Yet prefecture-level DFLE values were estimated only at the time of birth. Hashimoto (1999) calculated DFLE at 65 years of age for each prefecture, but these results are for 1999. Consequently, we lack a firm understanding of recent results of the prefecture-level health expectancy of Japanese elders.

Second, limited attention has been given to the factors connected to health expectancy. Overseas researchers have begun to analyze the ways through which disparities in health expectancy measures are produced. A 2005 cross-national study by Jagger et al. (2008), which included 25 European countries, recorded close relationships between healthy life years (HLYs) at 50 years of age and various socioeconomic indicators. In their study, GDP per capita and expenditure on elder care were positively related to HLYs for both men and women, whereas long-term unemployment had negative impacts on men's HLYs. Recently, Fouweather and his colleagues (2015) repeated the same analyses and found material deprivation as an important predictor of HLYs at 50 in 2005 and 2010. In addition, the unemployment rate was inversely associated with DFLE values in Great Britain (Wohland et al. 2014) and Spain (Gutierrez-Fisac et al. 2000), while per-capita GDP was linked to increases in DFLE across 31 administrative divisions of China (Liu et al. 2010).

The socioeconomic factors related to health expectancy are of particular importance for Japan for two reasons. First, it has been suggested that the magnitude of social

disparities has grown large in more recent years (Ishida and Slater 2011). This point directly challenges the traditional discourse regarding Japan as a homogeneous society with little internal variation (Nakane 1970). In the face of emerging social inequalities, it is of greater importance to investigate whether and to what extent differences in socioeconomic conditions are linked to health inequalities within Japan. Second, the issue of health disparities is addressed in the national health-promotion program. The second phase of Healthy Japan 21 aims to narrow regional disparities in DFLE for the period between 2013 and 2022 (Ministry of Health, Labour, and Welfare 2015). Achieving this goal requires research that identifies factors responsible for DFLE differentials and shows how to effectively address the problem of health inequalities in the country.

The purpose of the present study is to investigate factors associated with DFLE at 65 years of age across 47 Japanese prefectures in 2010. This research departs from previous studies in the following two important ways. First, guided by past research findings from other countries (Fouweather et al. 2015; Gutierrez-Fisac et al. 2000; Jagger et al. 2008; Liu et al. 2010; Wohland et al. 2014), we pay special attention to a prefecture's wealth, labor, and welfare characteristics. By analyzing the role of these factors in producing DFLE differentials, this research seeks to contribute to the goal of the second phase of Healthy Japan 21: to reduce regional inequalities in DFLE for the period 2013–2022. Second, this work focuses on DFLE at older ages. With the arrival of a “super-aging” society (Muramatsu and Akiyama 2011), the health status of the older population has gained considerable importance, because an expansion of old adults in ill health is likely to increase the demand for medical and health care provisions in the future (Jagger et al. 2008).

Methods

DFLE at 65, denoting the number of expected years without disability at 65 years of age, by gender and prefecture, is computed using the Sullivan (1971) method. This method requires data on mortality and the age- and gender-specific prevalence of health conditions. The present study focuses on disability to compute health expectancy. Data on disability are taken from *Kokumin Seikatsu Kiso Chosa* (Comprehensive Survey of Living Conditions) of 2010. This is a repeated cross-sectional survey conducted annually since 1986 by the Ministry of Health, Labour, and Welfare (detailed information about the survey can be found at <http://www.mhlw.go.jp/toukei/list/20-21.html>). Our research uses the 2010 data, because the most recent prefecture-level life tables are from 2010. The household is the primary sampling unit for this survey, and

Table 1 Socioeconomic factors included in the analysis

Measures	Definitions	Coding
Wealth		
Income per capita	Income per person (annual)	logged
Labor		
Unemployment	Unemployment rate for each gender	in percentage
65 + worker rate	Proportion of employees (65 +)	in percentage
Welfare		
Social welfare expenditures	Proportion of social welfare expenditures in total expenditures	in percentage
LTCI expenditures per capita	Per-capita LTCI-related expenditures between March 2010 and February 2011	in 10,000 yen
65 + recipients of public assistance	Proportion of older people protected by public assistance (65 +)	in percentage

Information on income per capita, unemployment, the older worker rate, and welfare expenditures comes from Social Indicators by Prefecture, 2014

Data on older individuals who receive public assistance are constructed from Overview of the Report on Welfare, 2010. Data on LTCI expenditures are taken from the Report on LTCI Activities, 2010

the 2010 survey included 289,363 households located in 5510 areas, randomly selected from 47 Japanese prefectures. All household members were then surveyed. Proxy reports were allowed when respondents had difficulty completing the survey on their own. In 2010, in total, 609,819 respondents participated in the survey. Our sample is limited to those who are older than 65 years of age, resulting in a final sample size of 149,718 individuals.

Mortality data for this study come from prefecture-specific life tables of 2010. Data from *Jinko Dotai Chosa* (Vital Statistics in Japan) and the Population Census are used to construct prefecture-level life tables, which have been constructed every five years since 1965. Details about prefecture-level life tables are presented at <http://www.mhlw.go.jp/toukei/saikin/hw/seimei/list54-57-02.html>.

Measures

This study defines disability based on responses to either of the following two survey questions: (1) Are you currently institutionalized in a hospital, clinic, or long-term care facility? (2) Do you have any limitations in carrying out normal activities due to health problems? The first question allows us to include information about persons residing in hospitals, clinics, or long-term care facilities. The inclusion of data on the institutionalized population is of particular importance, given that (1) the majority of those in health-related institutions in Japan are older than 65 years, and (2) our estimates of DFLE are at 65 years of age. Those who answered “yes” to either question are considered to have disability. The prevalence of disability is then stratified by prefecture, gender, and age in accordance with the life tables.

To investigate factors associated with DFLE at 65 across 47 Japanese prefectures, we focus on the following three domains of a prefecture’s socioeconomic conditions:

wealth (i.e., annual income per capita), labor (i.e., the unemployment rate and the proportion of workers older than 65 years of age), and welfare (i.e., the percentage of welfare expenditures in total expenditures, per-capita expenditures on the long-term care insurance (LTCI) program, and the percentage of older adults protected by public assistance). We estimate per-capita LTCI expenditures by dividing the total amount of LTCI expenditures by the number of LTCI recipients older than 65 years of age in each prefecture. We use information on public assistance as a proxy for material deprivation. Note that since the number of recipients of public assistance is heavily influenced by the population size of the prefecture, we estimate the proportion of elders who receive public assistance by dividing the number of older people (65 and above) protected by public assistance by the number of individuals older than 65 years of age. Details about each indicator, including definitions, coding strategy, and data sources, are provided in Table 1. All information is collected for 2010.

Analysis

The unit of analysis in the present study is a prefecture, and there are in total 47 prefectures in Japan. To investigate the relationship between prefecture-level DFLE at 65 and a set of socioeconomic indicators, we conduct variance-weighted least-squares regression analyses (Jagger et al. 2008). This strategy takes into account varying degrees of precision around the dependent variable (here prefecture-specific DFLE at 65) by using inverse-variance as a statistical weight. We estimate the following two types of models:

Table 2 Distribution of disability-free life expectancy (DFLE) at 65 across 47 prefectures, 2010

		Men	Women
1	Hokkaido	12.2	14.4
2	Aomori	11.8	13.6
3	Iwate	11.7	13.9
4	Miyagi	12.3	14.4
5	Akita	12.4	14.3
6	Yamagata	12.2	14.3
7	Fukushima	12.2	13.8
8	Ibaraki	13.4	14.7
9	Tochigi	12.4	14.5
10	Gunma	12.6	15.2
11	Saitama	12.5	14.0
12	Chiba	13.3	14.4
13	Tokyo	12.6	14.6
14	Kanagawa	12.9	15.2
15	Niigata	12.1	14.6
16	Toyama	12.1	14.5
17	Ishikawa	12.8	14.6
18	Fukui	12.3	14.6
19	Yamanashi	12.5	15.3
20	Nagano	12.6	14.5
21	Gifu	12.4	14.6
22	Shizuoka	13.2	16.0
23	Aichi	12.9	15.2
24	Mie	12.6	14.0
25	Shiga	12.5	13.7
26	Kyoto	12.9	14.4
27	Osaka	11.7	13.5
28	Hyogo	11.8	13.9
29	Nara	12.1	13.6
30	Wakayama	12.3	13.9
31	Tottori	12.1	14.4
32	Shimane	12.4	15.0
33	Okayama	11.5	13.7
34	Hiroshima	12.2	13.4
35	Yamaguchi	12.1	14.7
36	Tokushima	12.2	13.2
37	Kagawa	12.2	14.1
38	Ehime	11.9	14.0
39	Kochi	11.6	14.3
40	Fukuoka	12.0	13.5
41	Saga	11.6	13.9
42	Nagasaki	11.4	13.3
43	Kumamoto	12.4	14.4
44	Oita	11.7	13.6
45	Miyazaki	12.9	15.1
46	Kagoshima	12.5	14.8
47	Okinawa	12.9	15.5
Average		12.3	14.3

$$\text{Model 1 : } y_i = \alpha + \beta_{1k} \times x_{ik} + \varepsilon_i$$

$$\begin{aligned} \text{Model 2 : } y_i &= \alpha + \beta_{1k} \times x_{ik} + \beta_2 \\ &\quad \times \text{percentage of older individuals}_i + \varepsilon_i \end{aligned}$$

where y_i is DFLE at 65 for the i th prefecture in 2010, x_{ik} is the socioeconomic indicator k (with main effect β_1), and ε_i is an error term. We first test bivariate relationships between DFLE at 65 and each socioeconomic indicator (model 1), and we then include the percentage of the population older than 65 years of age as a control (model 2). Prior to estimating the models, we plotted the relationships between DFLE at 65 and each independent variable to identify influential data points. We present results from the regression models without adjusting for influential observations, because doing so did not alter our results. All analyses are performed separately for men and women due to marked differences in life expectancy and health expectancy between men and women.

Results

Results of prefecture-specific DFLE at 65 are presented in Table 2. In 2010, 65-year-old Japanese men on average could expect to live an additional 12.3 years without disability. Male DFLE at 65 ranged from 11.4 years in Nagasaki Prefecture (no. 42) to 13.4 years in Ibaraki Prefecture (no. 8). The average for women was 14.3 years, ranging from 13.2 years in Tokushima Prefecture (no. 36) to 16.0 years in Shizuoka Prefecture (no. 22). The spread in DFLE at 65 is larger for women than for men (2.8 years and 2.0 years, respectively). These results elucidate regional inequalities in the health expectancy of older men and women in Japan.

Table 3 provides descriptive information for independent variables included in the analysis. Levels of socioeconomic development vary greatly by prefecture. In 2010, per-person annual income level ranged from 2,025,000 yen (22,801 USD) in Okinawa Prefecture to 4,306,000 yen (48,486 USD) in Tokyo, suggesting that Okinawans earned less than half of individuals in Tokyo.¹ Large disparities are observed for the rest of the variables, but differences in welfare characteristics are of particular importance. LTCI-related expenditures per capita ranged from 192,000 yen (2162 USD) in Saitama Prefecture to 314,000 yen (3536 USD) in Okinawa Prefecture. Further, the proportion of elders who rely on public assistance reached more than 4.5% of the older population in Tokyo (for men) and Okinawa Prefectures (for women), while only 0.3% of older men and women in Toyama Prefecture lived on public assistance in 2010. These results show that between-

¹ The average exchange rate of 2010 was 1 USD = 88.81 JPY.

Table 3 Descriptive statistics of variables in the analysis

	Mean	Min.	Max.
Income per capita (in 1000 yen)	2654.8	2025.0	4306.0
Unemployment (%)			
Men	7.7	5.6	13.1
Women	4.9	3.2	8.2
65 + worker (%)	20.2	15.2	26.7
Social welfare expenditures (%)	3.9	2.7	5.5
Per-capita LTCI expenditures (in 10,000 yen)	26.5	19.2	31.4
65 + recipients of public assistance (%)			
Men	1.2	0.3	4.7
Women	1.3	0.3	4.9
Population older than 65 (%)	24.6	17.4	29.6

Table 4 Estimated relationships between DFLE at 65 and prefecture-level socioeconomic factors, 2010

	Men		Women	
	Model 1	Model 2	Model 1	Model 2
Wealth				
Income per capita (ln)	1.41***	0.82**	1.46***	1.45***
Labor				
Unemployment (%)	−0.13***	−0.12***	−0.34***	−0.31***
65 + worker (%)	0.08***	0.08***	0.16***	0.16***
Welfare				
Social welfare expenditures (%)	0.29***	0.17***	0.18***	0.11***
Per-capita LTCI expenditures (10,000 yen)	−0.08***	−0.06***	−0.08***	−0.08***
65 + recipients of public assistance (%)	−0.003	−0.01	−0.29***	−0.30***

Model 1 estimates bivariate relationships between DFLE at 65 and each indicator

Model 2 adjusts for the proportion of the population older than 65 as a control variable

*** $p < 0.001$; ** $p < 0.01$

prefecture variations in wealth, labor, and welfare characteristics remain large. Our next task is to investigate the degree to which these differences in socioeconomic conditions translate into differentials in health status.

Table 4 presents the results of regression analyses, which assess the importance of a prefecture's wealth, labor, and welfare characteristics on DFLE at 65. Income per capita, unemployment levels, the percentage of workers older than 65 years of age, social welfare expenditures, and LTCI-related expenditures are strongly related to DFLE at 65 for men and women (model 1). The association between these variables and DFLE at 65 remains significant for both genders even when adjustment is made for the percentage of the population older than 65 (model 2). For instance, men's DFLE is strongly associated with the percentage of social welfare expenditures in total expenditures. Net of the percentage of the older population, a 1% increase in social welfare expenditures represents 0.17 additional disability-free years for men. For women, unemployment is strongly related to DFLE at 65: a 1% increase in women's unemployment rate is associated with a 0.31-year reduction in

disability-free life years, controlling for the percentage of the older population. Here, it is important to note that these results are in the expected direction: Higher levels of a prefecture's wealth and welfare are positively related to the duration of disability-free life at age 65, while unemployment is inversely associated with DFLE at 65 for men and women. Importantly, the larger the LTCI-related expenditures, the shorter the length of disability-free life at 65 years of age. The relationship between public assistance and DFLE greatly differs by gender. The percentage of older people who receive public assistance is negatively related to DFLE at 65 for women only.

Discussion

Growing evidence suggests health differentials within Japan. While studies examining geographic inequalities in mortality abound (Robine et al. 2012; Suzuki et al. 2012a, b), few researchers to date have focused on regional differences in health expectancy. Using recent nationally

representative data, the current study investigated how a prefecture's socioeconomic conditions are related to DFLE at older ages. Our results indicate associations between a prefecture's wealth, labor, and welfare characteristics and health, as measured by DFLE at 65. Although it has been suggested that Japan is a homogeneous society with little internal variation (Nakane 1970), the findings of the present study reveal wide disparities in socioeconomic development levels across prefectures and further demonstrate how these differences translate into health inequalities across prefectures. Our findings add to the existing literature on the structural determinants of population health and have several important social policy implications.

First, we found a positive relationship between income per capita and DFLE at 65. Income has a positive impact on DFLE at 65, and its effect remains significant in all models for both genders. A diverse literature suggests that higher income contributes to health, helping individuals have access to health-related resources, such as a healthy diet, medication, health care services, and a less stressful living environment (Link and Phelan 1995). Our results offer support for these patterns. In contrast, material deprivation, measured by the proportion of older individuals who receive public assistance, is associated with a reduction in DFLE at 65, although the impact is observed only for women. This is in line with previous research findings about a link between poverty and poor health (Mirowsky and Ross 2001). Overall, these findings raise the possibility that welfare programs, particularly those targeted at improving the financial situation of Japanese elders, may have beneficial consequences for their health status. In fact, our results further support this point by showing a positive impact of social welfare expenditure levels on DFLE at 65 for both men and women across 47 prefectures.

Second, labor conditions are important for Japanese men's and women's health. Unemployment is inversely related to DFLE at 65. Although information on unemployment in this study is not restricted to the older population, we recorded a negative relationship between the overall unemployment rate and the well-being of older people. On the other hand, there is the positive relationship between the proportion of aged workers and DFLE at 65. Levels of later-life labor force participation are higher in Japan (Raymo et al. 2004), and the current results seem to offer support for the positive health impacts of active social participation among older men and women in Japan. It is important to note, however, that our results only suggest associations between labor force participation at older ages and DFLE at 65. In fact, a larger number of healthy older people may lead to higher levels of later-life labor force participation.

Finally, the impact of the LTCI policy deserves special note. Our work showed a negative relationship between per-capita LTCI expenditures and DFLE at 65 for both genders. It is important to note that the direction of the relationship between these two variables may be the reverse of what our model suggests: a large number of older people with disabling conditions may increase the demands for care services under the LTCI scheme, leading to higher levels of LTCI expenditures. The LTCI program provides older adults with various types of care services, such as bathing and toileting, care management counseling, and financial assistance for purchasing aiding devices. These services are made available through tax revenues, income-tested premiums, and co-payments (Tsutsui and Muramatsu 2005; Yong and Saito 2012). Debate continues regarding the feasibility of the LTCI program in the face of large increases in LTCI-related expenditures (Hayashi 2016), but the present findings suggest that improving the health of older people may contribute to reductions in long-term-care-related expenditures.

This study has several strengths. We utilized the most recent prefecture-level life tables and estimated DFLE at 65 for each prefecture in 2010. Estimates of prefecture-specific DFLE were published in 2010, but results are available only for DFLE at birth. The present findings advance our understanding of the distribution of health expectancy at older ages across prefectures. Further, this work offers a systematic study of the socioeconomic factors associated with DFLE. Prior research on the structural determinants of health expectancy (Fouweather et al. 2015; Gutierrez-Fisac et al. 2000; Jagger et al. 2008; Liu et al. 2010; Wohland et al. 2014) provided the conceptual framework for this study and helped to formulate our analyses. While past work included a wide range of economic, social, physical, and demographic variables (Kondo et al. 2005), we narrowed the focus of the investigation down to a prefecture's wealth, labor, and welfare characteristics, and we demonstrated how health disparities are manifested through differences in macro-level socioeconomic conditions.

Despite these strengths, this research has some limitations. First, several weaknesses of the independent variables are worth mentioning. To begin, the present study examines cross-sectional relationships between socioeconomic indicators and DFLE in 2010. Prior research suggests that it may take time for socioeconomic conditions to generate health inequalities (Hurst et al. 2013). To address the issue of the time-lagged effects of socioeconomic factors on health, we conducted supplemental analyses to include the socioeconomic indicators from 1995 as independent variables and tested how they are connected to DFLE in 2010. We found limited difference between the 1995 and 2010 models, except that the variable of welfare

expenditures is not significantly associated with men's DFLE in the 1995 model. The present study reports the results from 2010, but exploring the early origins of later-life health inequalities is an important direction for future research. Further, the present study focused only on prefecture-level socioeconomic indicators, thereby ignoring the influences of individual-level factors. Suzuki and his colleagues (2012a) reported the strong contextual effects of a prefecture on all-cause premature mortality in Japan, net of the individual effects of the residents. Our findings indicate the important role of macro-level indicators, but readers should note that the current study does not control for the impacts of individual-level factors. Also, in addition to wealth, labor, and welfare, there might be other factors influencing population health. Gutierrez-Fisac et al.'s (2000) study reported a negative association between the percentage of smokers in the population and DFLE at birth across Spanish provinces. Information on health behaviors could help us to capture the potential impacts of individual characteristics on health outcomes.

The second caveat concerns our measurement of disability. We incorporated the question regarding whether someone in the household is currently staying in a hospital, clinic, or long-term care facility to define disability via the first question. It should be noted that this information is self-reported and thus does not comprehensively cover the entire institutionalization population in Japan. In additional supplemental analyses, we estimated DFLE at 65 based only on the prevalence of disability. We find that the exclusion of the information on the institutionalized population result in the overestimation of DFLE at 65. Considering that older people tend to reside in health-related institutions, such as hospitals and clinics, we chose to include the information on persons living in a hospital, clinic, or long-term care facility. While older persons residing in other types of institutions are small in number, they nevertheless may influence the estimation of DFLE values.

Finally, a weakness of the Sullivan method should be mentioned. The Sullivan approach combines the period life table and the age-specific prevalence of morbidity from cross-sectional survey data (Imai and Soneji 2007). Consequently, the results of the Sullivan method fail to capture changes in mortality and morbidity, since they are based on the assumption of a stationary population (Crimmins et al. 1993). This point is of particular importance for Japan where the population has experienced drastic improvements in mortality since the middle of the previous century. Our work, however, is limited by its reliance on a cross-sectional approach to the health of the older population, and thus it does not account for variations in mortality and morbidity conditions experienced by different birth cohorts.

In conclusion, our results suggest what may work in reducing inequalities in health expectancy in the Japanese context. Efforts toward expanding income and welfare expenditures, encouraging labor force participation after retirement, and combating unemployment and poverty at the prefecture level have the potential to contribute to the narrowing of the regional gap in the health of older people. A prolonged economic recession since the late 1990s has generated public discourse regarding the fact that Japan has become a country with social disparities and large class differences (Ishida and Slater 2011). Our results indicate that emerging socioeconomic inequalities may have significant impacts on the health status of the population. The second phase of Healthy Japan 21 aims to decrease regional differences in health expectancy, but achieving this goal may require policymakers to address much broader issues currently facing Japanese society.

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