Changes in health inequalities among older individuals in Japan

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Abstract

This study examined how health inequalities with respect to income have changed among older adults in Japan from 2001 to 2022. The past two decades have witnessed a series of public pension reforms and increased labor force participation among older individuals. The pro-rich concentration of good health has become less clear for self-rated health and activities of daily living among older men. However, income-related inequality in stress/anxiety increased over time in men, and no clear trend was observed for health deficiencies or conditions. Compared to men, women showed more mixed results, with widening inequalities in health deficiencies and conditions.

Introduction

This study examined how health inequalities with respect to income have changed among older adults in Japan between 2001 and 2022. The past two decades have witnessed a series of public pension reforms and increased labor force participation among older individuals, both of which are likely to have affected their health conditions and income-related inequalities in health outcomes. We investigated the gradients and concentration indices (CIs) of selected health outcomes with respect to income and their changes over two decades.

Population health has improved over the past two decades. The life expectancy at age 60 for men and women rose from 21.72 and 27.13 years in 2001 to 23.58 and 28.84 years in 2022, respectively. The distribution of the age at death has also been increasing, as discussed in more detail by Shimizutani (2015). Figure 1 shows that the mode of age at death for men and women moved from 75 and 87 years in 2001 to 85 and 91 years in 2022, respectively. However, the evolution of health inequalities among older individuals has been largely understudied in Japan. Studies examining trends in health inequalities among the entire population have demonstrated mixed and inconsistent results, reflecting slower economic growth and widening income inequalities (Hiyoshi et al., 2013; Hiyoshi et al., 2023; Kachi et al., 2013; Watanabe and Hashimoto, 2012).

Public pension reforms may have also affected health inequalities among older adults. Since the early 2000s, a series of reforms have been characterized by reduced generosity of pension benefits, comprising two key components: (i) a gradual increase in the eligible age for

the full pension benefit from 60 to 65 years and (ii) reduced benefit multipliers (Oshio and Shimizutani, 2026). Both these components reduce retirement income and encourage individuals to work longer; however, their impact on health may be indeterminate. Moreover, a substantial portion of pensioners continue working in Japan (Oshio, Oishi, and Shimizutani, 2021; Oshio, Shimizutani, and Oishi, 2025). This implies that labor force participation may confound the impact of income on health and its inequality.

Methods

Study sample

We used large-scale data obtained from the Comprehensive Survey of Living Conditions (CSLC), which is conducted by the Ministry of Health, Labor and Welfare (MHLW). The CSLC has been conducted since 1986 and involves an annual household survey as well as health, income/savings, and long-term care surveys conducted every three years. Samples were collected nationwide using a two-stage random sampling procedure. First, approximately 5,400 districts were randomly selected from 940,000 national census districts. Second, approximately 290,000 households were randomly chosen from each district based on population size. Information on each co-residing household member was collected from the selected households.

In this study, we used repeated cross-sectional data collected from the eight most recent waves of the CSLC, conducted every three years from 2001 to 2022. Restricting the sample to

individuals aged 60–79 years who received public pension benefits, this study analyzed the data of 150,591 individuals (70,360 men and 80,231 women).

Variables

We focused on seven measures of health outcomes adjusted for higher values to indicate better health outcomes.

[1] Self-related health (SRH) scores (ordinal; range: 1–5). Based on the answers to the survey question, “What is your current health status? Is this good, somewhat good, average, somewhat poor, or poor?” We constructed a five-point score variable for SRH by allocating values of 1–5 from poor to good.

[2] Good SRH (binary). We constructed a binary variable for SRH by allocating 1 to good and somewhat good and 0 otherwise.

[3] No limitations to the activities of daily living (ADL) (binary). Based on the answers to the survey question on whether one has any limitations in ADL, we constructed a binary variable for no ADL limitation by allocating 1 to no and 0 otherwise.

[4] No subjective symptoms (binary). Based on the answers to the question of whether one has any subjective symptoms, we constructed a binary variable for no subjective symptoms by allocating 1 to no and 0 otherwise.

[5] Health deficiencies (continuous; range: 0–1). Following Abeliansky and Strulik (2019) and Börsch-Supan et al. (2021), we first compute the share of reported subjective symptoms out

of the total number of symptoms (43). We constructed a continuous index of health deficiencies by subtracting this ratio from one so that higher values indicate better health.

[6] Number of conditions reported by doctors (continuous; range 0–33). We counted the number of conditions reported by doctors from a list of diseases (33 in total) that were available and consistently defined for all waves. We then constructed a continuous index of conditions by subtracting the number of conditions from 33 to ensure that higher values indicated better health.

[7] No stress/anxiety (binary variable). We constructed a binary variable for no stress/anxiety by allocating 1 to no, and 0 otherwise, based on the answers to the question of whether one has any stress/anxiety.

We evaluated inequalities in health with respect to pretax income aggregated from its components for the couple or single person only (equivalized using 1.5 for a couple). We constructed income deciles for each year separately based on the equivalent income for men and women.

Statistical analysis

Based on these health and income variables, we first computed the income gradients of each health outcome for each year and examined how they evolved from 2001 to 2022. As higher values of each health variable indicate better health, a positive gradient indicates a pro-rich distribution of good health, and its increase over time indicates widening health inequality. We

examined the inequality trend by computing the correlation coefficient between the year and the gradient in each year, along with its statistical significance for each health outcome.

We conducted a similar analysis using the income-related CI for each health outcome. The CI is a measure of income inequality similar to the Gini index. The CI was twice the area between the concentration curve of the ill health variable and the 45-degree line, indicating no relationship between the two variables. Similar to the gradient, a positive CI indicates a pro-rich distribution of good health, and its rise indicates widening health inequality. Changes in the CI over time not only reflect changes in the gradient, but also changes in the level of health outcomes. For example, even with no change in the gradient, an overall improvement in the level will reduce the CI.

Results

Figure 2 shows the distribution of each health outcome across income deciles for men and women in 2001 and 2022, respectively. Positive income gradients were observed for the two SRH measures and ADL in both years and genders, while the results were more mixed and inconsistent for other health outcomes. The curves shifted upward for the two SRH measures for women, whereas for ADL, subjective symptoms, and health deficiencies, the curves shifted upward for both men and women. These shifts suggested an overall improvement in health outcomes. Meanwhile, changes in the gradients between the two years were unclear for any health outcomes.

Figure 3 shows the evolution of the estimated gradient along with its 95% confidence interval between 2001 and 2022 for each health outcome. For men, the downward trend of the curve indicating reduced inequality was observed most clearly for ADL, while the two SRH measures showed S-shaped curves without any clear trend. There were no substantial changes in subjective symptoms, health deficiencies, or conditions between the first and last year. By contrast, a clear increase in the gradient for no stress/anxiety suggests increased income-related inequality in mental health. Compared with men, women showed more mixed evolutions in general, although the increase in the gradient was remarkable for health deficiencies and conditions.

Figure 4 presents the results obtained by replacing the income gradient with income-related CIs. The shapes of the curves remained generally similar to those in Figure 3, whereas the downward trend became somewhat more remarkable for the two SRH measures and ADL for men.

To statistically evaluate the trend of inequalities in health, Table 1 presents the correlation coefficients between 2001 and 2022 and the gradient/CI in each year, along with their *p*-values for each health outcome. When evaluated by CI, the inequalities in both SRH measures decreased during the study period, with $p = 0.078$ for SRH score and $p = 0.042$ for good SRH, more clearly than when evaluated by the gradient. This also holds true for ADL. By contrast, income-related inequality in stress/anxiety widened in terms of both the gradient and CI. For women, there was no clear trend in SRH, ADL, subjective symptoms, or stress/anxiety,

while inequality increased for health deficiencies and conditions.

Discussion

This study examined how health inequalities with respect to income have changed among older adults in Japan between 2001 and 2022. These results provide partial evidence that income-related inequalities among men have decreased over the past two decades. While higher-income individuals tend to have more favorable health conditions, this pro-rich concentration of health has become less clear for SRH and ADL among older men. However, income-related inequality in stress/anxiety widened over time in men, and no clear trend was observed for health deficiencies or conditions. Women showed more mixed and inconsistent trends in health inequalities than men. There has been no clear trend in inequalities in SRH, ADL, subjective symptoms, or stress/anxiety, whereas health deficiencies and conditions have become more concentrated in lower-income individuals.

Although we did not identify the factors driving these changes, a series of public pension reforms is likely to have affected them. As discussed in our previous studies (Oshio Shimizutani, and Oishi, 2025; Oshio and Shimizutani, 2026), postponed eligibility ages for full pension benefits and reduced benefits encourage older individuals to work longer. Enhanced labor force participation is likely to have two effects on income-related inequalities in health. First, it may improve pensioners' overall health conditions, assuming that work has a favorable impact on general health (Oshio and Shimizutani, 2023). Second, poor health may become more

closely linked to low income because it represents a limited ability to work and earn a wage income. The left panel of Figure 5 shows an increase in the health-income gradient from 2001 to 2022, which is consistent with the second impact. The first impact is likely to reduce the pro-rich concentration in healthy individuals, whereas the second may have the opposite effect. The observations in Figures 2 and 3 and Table 1 suggest that the first impact dominated the second for men with SRH, and more remarkably, for ADL. In addition, a more pro-rich concentration of mental health problems among men appears to be related to their enhanced labor force participation. This is consistent with the observations of Oshio and Shimizutani (2023). However, women did not experience any substantial changes in health inequalities, except for health deficiencies and conditions, despite an increase in their labor force participation. This may reflect differences in the working styles or roles played within the family between men and women.

Another possible confounder of the relationship between income and health is the public long-term care (LTC) program, introduced in 2001 (Mitchell et al., 2006). The proportions of men and women who needed assistance in daily life and were certified as requiring LTC in the study sample were 3.3% and 3.5 %, respectively. As the LTC beneficiaries are concentrated in lower-income individuals (right panel of Figure 5), the LTC program may moderate income-related inequalities in health if it is effective in reducing ADL limitations. However, there is no clear evidence of reduced income-related inequalities in improving functional ability among LTC recipients (Amemiya et al., 2019).

Conclusion

Over the past two decades, a series of public pension reforms have been accompanied by a partial reduction in income-related inequalities in health outcomes. The pro-rich concentration in favorable SRH and no ADL limitation was reduced for men, probably due to enhanced labor force participation. However, changes in health inequalities have been mixed and inconsistent with other health outcomes in women.

References

Abeliansky AL, Strulik H. Long-run improvements in human health: Steady but unequal. The Journal of the Economics of Ageing. 2019;14:100189.

Amemiya A, Kondo N, Saito J, Saito M, Takagi D, Haseda M, et al. Socioeconomic status and improvement in functional ability among older adults in Japan: a longitudinal study. BMC Public Health. 2019;19:209.

Börsch-Supan A, Ferrari I, Salerno L. Long-run health trends in Europe. Journal of the Economics of Ageing. 2021;18:100303,

Hiyoshi A, Fukuda Y, Shipley MJ, Brunner EJ. Inequalities in self-rated health in Japan 1986–2007 according to household income and a novel occupational classification: national sampling survey series. Journal of Epidemiology and Community Health. 2013;67:960–

965.

Hiyoshi A, Honjo K, Platts LG, Suzuki Y, Shipley M, Iso H. Trends in health and health inequality during the Japanese economic stagnation: implications for a healthy planet. SSM Population Health. 2023;22:101356.

Kachi Y, Inoue M, Nishikitani M, Tsurugano M, Yano E. Determinants of changes in income-related health inequalities among working-age adults in Japan, 1986-2007: time trend study. Social Science & Medicine. 2013;81:94–101.

Mitchell OJ, Piggott S. Shimizutani Aged-care support in Japan: perspectives and challenges. Benefits Quarterly. 2006 (1st quarter);7–18.

Oshio T, Shimizutani S. Will working longer enhance the health of older adults? A pooled analysis of repeated cross-sectional data in Japan. Journal of Epidemiology. 2023;33(1):15–22.

Oshio T, Oishi A, Shimizutani S. Social Security Programs and the Elderly Employment in Japan. in Axel Börsch-Supan and Courtney Coile eds. Social Security Programs and Retirement around the World: Reforms and Retirement Incentives, University of Chicago Press, 2021: 271–296.

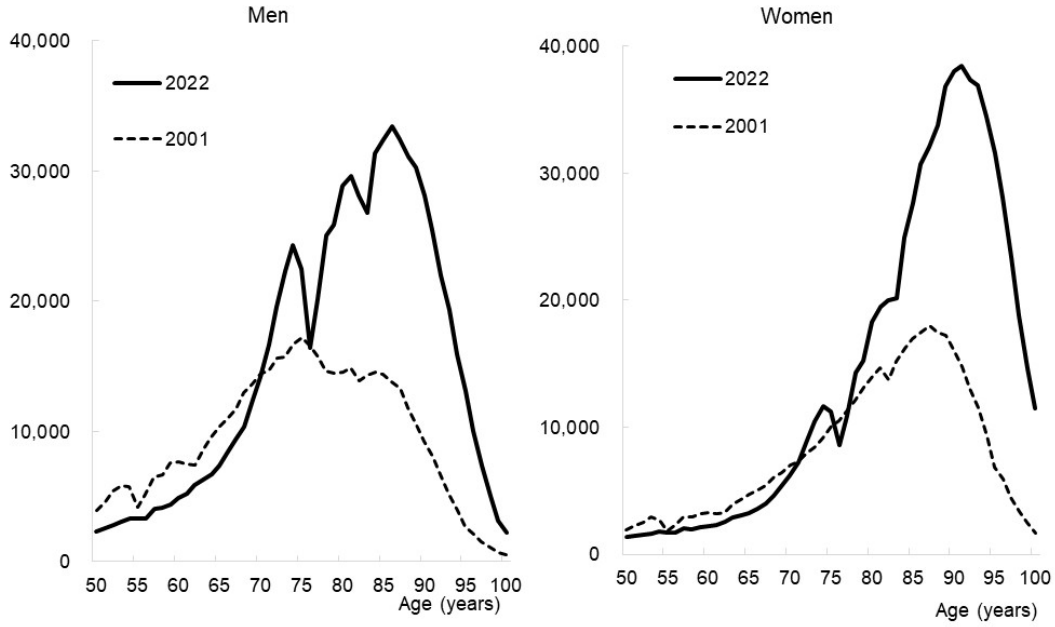
Oshio T, Shimizutani S. Oishi A. Relationship between social security programs and elderly employment in Japan. in Axel Börsch-Supan and Courtney Coile eds. Social Security Programs and Retirement around the World: The Effects of Reforms on Retirement Behavior, University of Chicago Press, 2025:233–256.

Oshio T, Shimizutani S. Social security reforms and inequality in Japan, NBER International Social Security project: Phase 11, 2026, *mimeo*.

Shimizutani S. Population aging in postwar Japan, Asia-Pacific Review, 2015;22(2):53–76.

Watanabe R, Hashimoto H. Horizontal inequity in healthcare access under the universal coverage in Japan; 1986-2007. Social Science & Medicine. 2012;75:1372–1378.

Figure 1. Distribution of age of death: 2001 and 2024



(Source) Ministry of Health, Labour, and Welfare. Life table (2001–2022).

Figure 2. Health outcomes across ages: 2001 and 2022

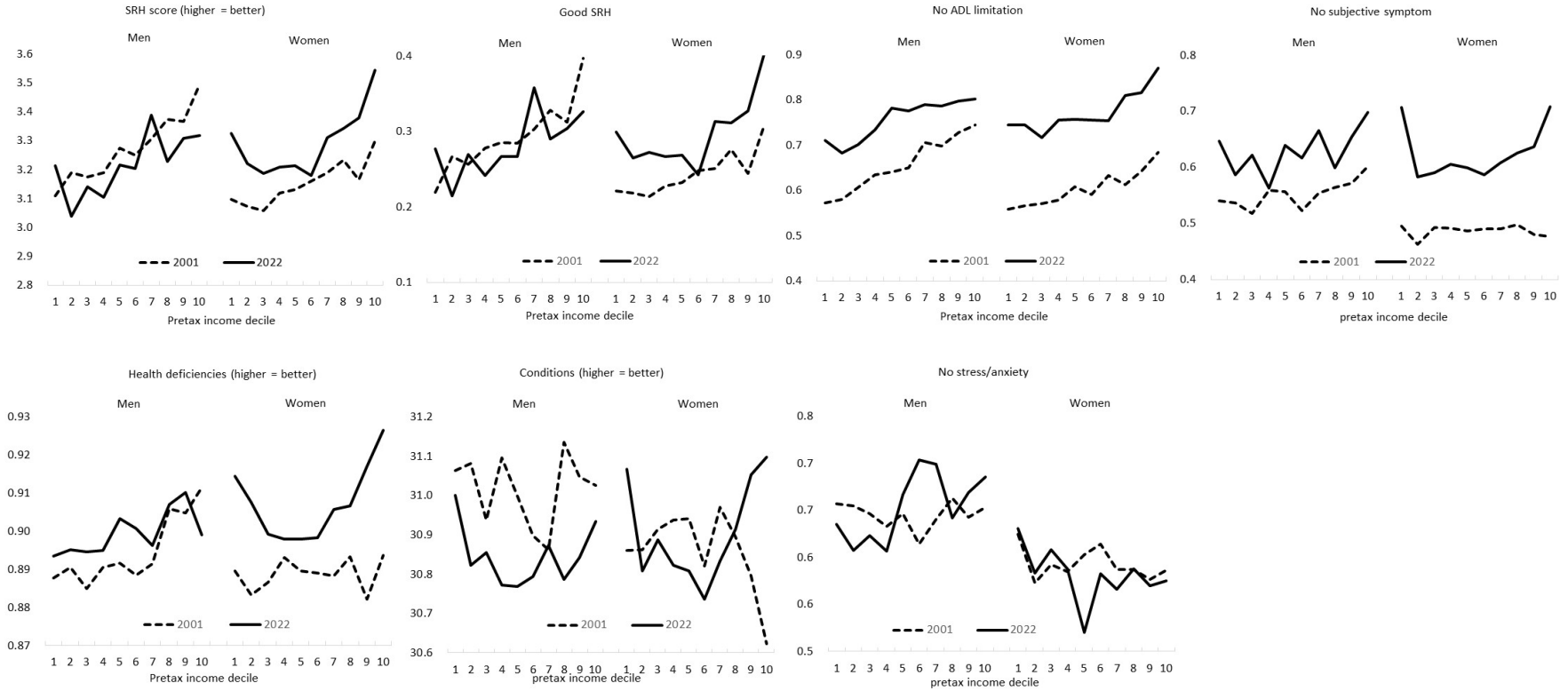


Figure 3. Income gradients of health outcomes: 2001–2022

(Note) Error bars indicate a 95% confidence interval.

Figure 4. Concentration indexes of health outcomes: 2001–2022

(Note) Error bars indicate a 95% confidence interval.

Table 1. Correlation coefficients between year and income gradient/CI of each health outcome

	Men				Women			
	Gradient		CI		Gradient		CI	
		[*p*-value]		[*p*-value]		[*p*-value]		[*p*-value]
SRH score (higher = better)	–0.249	[0.552]	–0.655	[0.078]	–0.013	[0.975]	0.080	[0.852]
Good SRH	–0.299	[0.473]	–0.725	[0.042]	0.107	[0.801]	–0.034	[0.937]
No ADL limitation	–0.727	[0.041]	–0.920	[0.001]	–0.048	[0.910]	–0.177	[0.675]
No subjective symptom	0.200	[0.635]	0.562	[0.148]	0.358	[0.384]	0.294	[0.481]
Health deficiencies (higher = better)	–0.096	[0.822]	–0.245	[0.559]	0.805	[0.016]	0.795	[0.019]
Conditions (higher = better)	0.311	[0.549]	0.452	[0.260]	0.812	[0.050]	0.901	[0.002]
No stress/anxiety	0.838	[0.009]	0.861	[0.006]	–0.423	[0.297]	–0.447	[0.267]

(Note) Positive (negative) signs indicate increased (reduced) inequality.

Figure 5. Labor force participation and long-term care beneficiaries across income deciles