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主　論　文　要　旨

No.1

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主 論 文 題 名：Social Determinants of Health in Japan -The Life Course Perspective-

（内容の要旨）

This dissertation presents researches on social determinants of health, standing on the perspective of life course approach, by using the samples of Japanese people. It comprises seven chapters. Chapter 1 is the introduction of the dissertation. Chapter 2 and 3 study social determinants of health in the earlier stage of life: childhood and working-age. Chapter 4 and 5 focus on social determinants of health in old age. Chapter 6 studies a way to promote preferable health behavioural choices by using financial incentives. Chapter 7 concludes the dissertation in the end.

Chapter 1 introduces the situation about health in Japan, focusing on average life expectancy, healthy life expectancy, cause-specific mortality rates and expenditures for health care. Next, it suggests that extending working life and healthy life expectancy is significant to respond to financial challenges associated with longevity by introducing a simple conceptual model. Retirement policy in Japan and determinants of retirement are also briefly reviewed to consider a way for extending working life by later retirement. As one of the most important determinants of retirement is health condition, it is necessary to think of a way to enhance individuals' health in later life. I emphasise the particular importance of social determinants of health since they are 'risk of risks' which are in 'upstream' as a fundamental cause of poor health. The life course approach needs to be prioritised since one's health is being formed throughout the whole life, and thus approaches are required from earlier life stages to enhance health in later life.

In Chapter 2, socioeconomic status captured by income in childhood and mid-adulthood is targeted. Studies across Europe and the US report that childhood socioeconomic disadvantage is associated with poorer health in adulthood. By

contrast, a study in Japan suggests that childhood socioeconomic disadvantage may be positive for adult health. In this chapter, the association between intergenerational income mobility and self-rated health in Japan is assessed, using detailed childhood income data for 1610 men and 1885 women aged 30–49 years. An instrumental variable approach is used to identify the causal effect of upward income mobility on adult health. It is found that low father's income during childhood is associated with smoking and alcohol consumption in adult life for both men and women. For men, upward income mobility is associated with worse health. Certain behavioural choices related to income mobility, such as long working hours, may have detrimental health effects.

In Chapter 3, the relationship of hours of work as one of the most important components of working conditions with health is considered. It aims to examine the causal relationships of hours of work with health behaviours and health outcomes. The data are derived from Japan Household Panel Survey/Keio Household Panel Survey. In total, data from 2677 men and 2170 women are analysed to show the effects of hours of work on body mass index, smoking, and sleeping hours. To deal with the potential endogeneity of decisions about hours of work, the instrumental variable approach is used. Hours of work have a negative impact on hours of sleep among men (coefficient [coef.], -0.371; 95% confidence interval [CI], -0.519 to -0.223). Longer hours of work also increase the probability of men being obese (coef., 1.108; 95% CI, 0.234 - 1.981) and the number of cigarettes they smoke each day (coef., 1.007; 95% CI, 0.037 - 1.978). For women, longer hours of work increase the probability of being obese (coef., 0.029; 95% CI, 0.009 - 0.050) and decreased the hours of sleep (coef., -0.416; 95% CI, -0.618 to -0.214). This chapter suggests that the health consequences of long hours of work include health behaviours and health outcomes that can lead to higher risks of morbidity and mortality.

In Chapter 4, the study about cognitive functioning in later life is conducted. In Japan, with the largest percentage of population aged 65 years or over, a dementia strategy is needed not only from a medical perspective, but also from a social policy viewpoint. This study aims to verify the association between socioeconomic factors and cognitive decline among Japanese elderly people. Cognitive decline is assessed over a 15 - year follow - up period using memory tests or through identifying

missing/proxy responses to survey questions due to cognitive dysfunction. I analyse 1886 men and 2102 women in Japan, using competing risk models for cognitive decline, to consider survival effects. Survival effects have not been considered so far although those who live longer may be more likely to experience cognitive decline. Men with higher income have a lower risk of cognitive decline (sub‐hazard ratio [SHR]: 0.997, 95% confidence interval (CI): 0.995‐0.999). Women with higher education have a lower risk of cognitive decline: 8 to 9 years (SHR: 0.646, 95% CI: 0.457‐0.914) and ≥12 years (SHR: 0.360, 95% CI: 0.164‐0.794) than women with 0 to 7 years of education. This chapter suggests that cognitive decline among the elderly Japanese population is associated with socioeconomic factors, such as income and education, even after taking survival effects into account.

Chapter 5 aims to estimate the average treatment effect of working past the current retirement age on the health of Japanese men. Publicly available data from the National Survey of Japanese Elderly, extracting a sample of 1288 men who are 60 years or older, are used. Survey respondents were followed-up for at most 15 years for the onset of four health outcomes: death, cognitive decline, stroke and diabetes. By using the propensity score method, the healthy worker effect is adjusted for by incorporating economic, sociodemographic and health data in the form of independent variables. By calculating the differences in times to a health outcome between those in employment and those not employed, the average treatment effects on health of being in paid work past retirement age are estimated. Compared with those not employed, those in employment lived 1.91 years longer (95% confidence interval, CI: 0.70 to 3.11), have an additional 2.22 years (95% CI: 0.27 to 4.17) before experiencing cognitive decline, and have a longer period before the onset of diabetes and stroke of 6.05 years (95% CI: 4.44 to 7.65) and 3.35 years (95% CI: 1.42 to 5.28), respectively. It is also observed that there are differences between employees and the self-employed: the self-employed individuals have longer life expectancies than employees. In terms of years to onset of diabetes or stroke, however, significant benefits to health of being an employee but not self-employed are observed. In conclusion, the study finds that being in employment past the current age of retirement has a positive impact on health.

In Chapter 6, the study about one of the useful schemes for health promotion which

utilise psychological and economic incentives is conducted. Although providing incentives for a better lifestyle has been of increasing concern, there is insufficient evidence about its effect. Therefore, this chapter aims to discover new insights by verifying the effect of rewards to motivate persistence in a project for health promotion. A total of 7,622 participants of an incentivized project for health promotion (Wellness Point Project) are recruited from 6 municipalities in Japan, namely Tohoku, Chubu, Kanto, Kinki, and Chugoku, of which the 4,291 individuals who have the necessary information for estimation are analysed. Persistence in the project is judged by whether there is information about daily steps and/or participation in some fitness classes every month for one year at most. In addition, the reason why participants chose certain rewards is used in order to categorize the characteristic of rewards. Opt-out hazard ratios from the project are estimated using survival time analysis. Furthermore, the estimation in the model includes individual features such as age, education, status of physical activity before joining the project, lifestyles such as smoking, drinking, and so on. A multivariate analysis reveals that those who had chosen a reward for regional contribution are more likely to opt out than those who have chosen a certain reward because it is close to cash. The opt-out hazard ratio is 1.63 (95% CI: 1.18-2.25) among men and 1.40 (95% CI: 1.08-1.81) among women. In addition, insufficient physical activity, smoking, working for men, and physical condition for women are associated with opt-out. This research verifies that a reward that participants felt is close to cash, compared to the internal motivation of regional contribution, could enhance the persistence rate of the project. Moreover, it is found that not only giving incentives but also considering participants' conditions is necessary to enhance persistence.

Finally, this paper ends with the summary, the contributions, policy implications and remaining questions that should be investigated by a further research in Chapter 7.