A simulation study to shorten a long-term care period and to reduce national medical care expenditure in Japan

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We aimed to explore a target to shorten a period for long-term care defined by a difference between life expectancy and healthy life expectancy (long-term care period) while reducing national medical care expenditure in Japan. We constructed a system dynamics model with two aging chains of independent and dependent people aged 65 years or older separately by sex. Parameters were calibrated using reference data obtained from official statistics on population, the numbers of deaths, the number of dependent people and the medical care expenditure in 2005, 2010 and 2015. Life expectancy, healthy life expectancy and national medical care expenditure were projected to 2030 by four scenarios: 1) status quo, 2) reducing the transition rates from the independent to dependent state by 20% from 2015 to 2030, 3) reducing death rates by 20% from 2015 to 2030, and 4) a combination of 2) and 3). It was projected that long-term care period at age 65 would be the shortest in Scenario 2 and that medical care expenditure would be lower in Scenarios 1 and 2. In conclusion, transition rates from the independent to dependent state should be lowered to shorten long-term care period while suppressing the increase in medical care expenditure. Future studies should incorporate stocks of working populations and cost of long-term care to examine sustainability of social security of Japan.
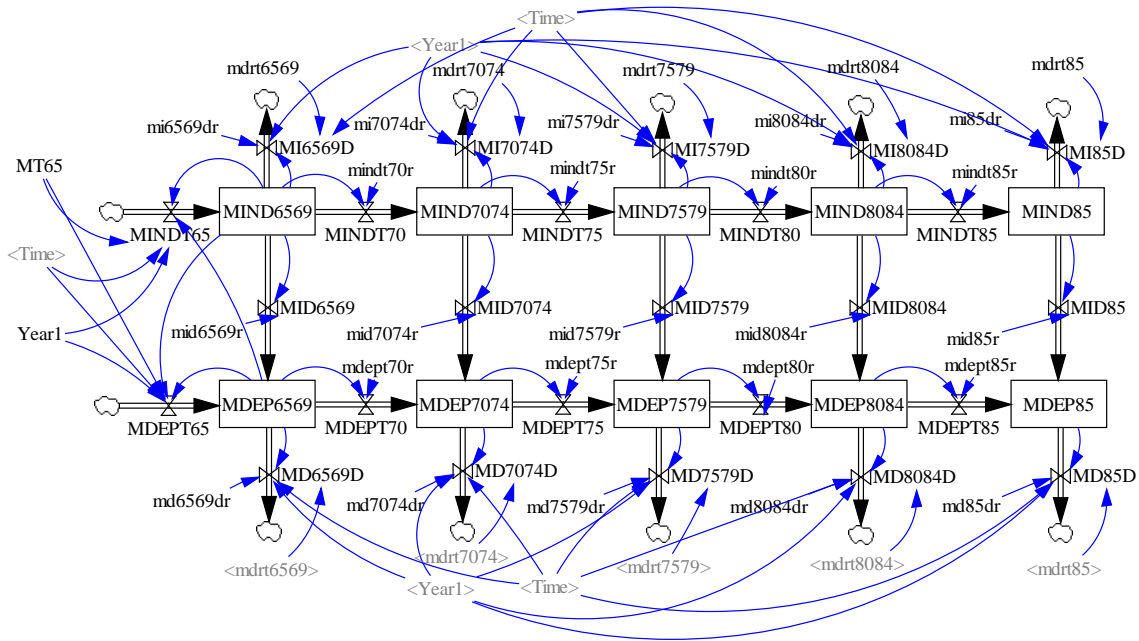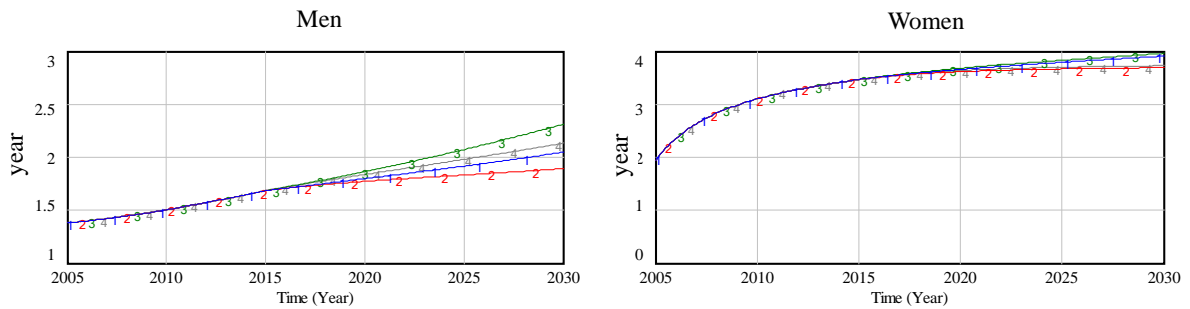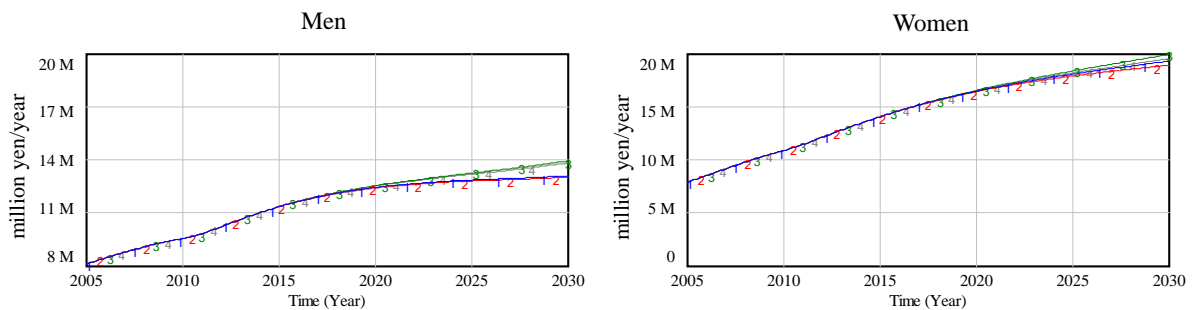
Figure 1. Basic model structure

Figure 2. Change of long-term care period at age 65 by scenario

Figure 3. Change of national medical expenditure at ages 65 years or older by scenario

References

Anzai M, Nobuhara H. Comparative analysis of medical care expenditure of the elderly by the presence of certification for long-term care need. J Health Welfare Stat 2011;58(5):14-21.

Chiang CL. The Life Table and Its Applications. Robert E. Krieger Publishing Company, Inc., Malabar, 1984.

Hashimoto S, Kawado M, Kato M, et al. Study on calculation methods of average independent period by the Long-term Care Insurance. J Health Welfare Stat 2008;55(10):25-30.

Long-Term Care Insurance Act (December 17, 1997, No. 123). Available from: http://www.japaneselawtranslation.go.jp/law/detail_main%3Fvm%3D%26id%3D94 (accessed on March 27, 2018).

Ministry of Health, Labour, and Welfare. Overview of the Abridged Life Table 2016. 2017. Available from: http://www.mhlw.go.jp/toukei/saikin/hw/life/life16/dl/life16-15.pdf (accessed on March 28, 2018)

Ministry of Health, Labour, and Welfare. Summary of the National Health and Nutrition Survey 2015. 2016.

Ministry of Health, Labour and Welfare. Overview of the National Medical Care Expenditure in FY2015. 2017. Available from: http://www.mhlw.go.jp/toukei/saikin/hw/k-iryohi/15/dl/data.pdf (accessed on March 23, 2018)

Ministry of Health, Labour and Welfare. Health Japan 21 (the second term). Available from: http://www.mhlw.go.jp/seisakunitsuite/bunya/kenkou_iryou/kenkou/kenkounippon21/en/kenkounippon21/ (accessed on March 23, 2018)

Ministry of Health, Labour and Welfare. Report of Care Payment of the Long-term Care Insurance. Available from: http://www.mhlw.go.jp/toukei/list/84-1.html html (accessed on March 27, 2018).

Ministry of Health, Labour and Welfare. Vital Statistics. Available from: http://www.mhlw.go.jp/english/database/db-hw/vs01.html (accessed on March 27, 2018).

Research Group of the Health and Labour Sciences Research Grant (PI: Shuji Hashimoto). A guide for calculation methods of healthy life expectancy. Ministry of Health, Labour and Welfare, 2012.

Statistics Bureau, Ministry of Internal Affairs and Communications. Population Census. Available from: http://www.stat.go.jp/english/data/kokusei/index.html (accessed on March 27, 2018).

Statistics Bureau, Ministry of Internal Affairs and Communications. Population Estimates. Available from: http://www.stat.go.jp/english/data/jinsui/1.html (accessed on March 26, 2018).

Sugiyama T, Goryoda S, Inoue K, Sugiyama-Ihana N, Nishi N. Construction of a simulation model and evaluation of the effect of potential interventions on the incidence of diabetes and initiation of dialysis due to diabetic nephropathy in Japan. BMC Health Serv Res 2017;17(1):833.

Sullivan DF. A single index of mortality and morbidity. HSMHA Health Rep 1971;86:347-54.

Zhang P, Zhang X, Brown J, Vistisen D, Sicree R, Shaw J, Nichols G. Global healthcare expenditure on diabetes for 2010 and 2030. Diabetes Res Clin Pract 2010;87(3):293-301.