Socioeconomic status disparities in late-life disability based on age, period, and cohort in Japan

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ABSTRACT

Introduction: Effects of disparities in socioeconomic status (SES) on late-life disabilities have been reported around the world. However, there are only a few studies that have examined age, period, and cohort dependent influences of SES disparities on late-life disabilities. We investigated associations between SES disparities and late-life disability based on the Age-Period-Cohort. We also investigated how macro-economic conditions unique to a period, or a cohort might explain the period or the cohort trends.
Methods: Data were obtained from people aged 65 and over that responded to the Comprehensive Survey of Living Conditions, which had been conducted every three years from 1989 to 2013. SES was assessed via household income. Disability was assessed as disabilities in performing Basic Activities of Daily Living (BADL). Income disparities were evaluated by the slope index of inequality (SII) and the relative index of inequality (RII). Each Age-Period-Cohort dimension was simultaneously controlled using a model for cross-classification of random effects.
Results: Differences in BADL disabilities due to income disparities decreased with age and reversed after approximately 80 years of age. Income disparities in BADL disability changed across periods, by increasing in periods with a high unemployment rate, which started two to four years before the period. Moreover, results of using SII and RII were nearly identical.
Conclusions: Higher mortality in elderly with lower income might be related to a reduction of income disparities in BADL disability in Japan. Furthermore, exposure to harsh economic conditions might contribute to increased disparities in BADL disability a few years later.

1. Introduction

Issues related to maintaining and improving health and well-being among older adults have become more important than before as the number of older people have increased absolutely and relatively along with the aging population. In addition, increases in health problems associated with aging are related to significant increases in costs for medical care, social services, and long-term care for the older population. Therefore, studies of late-life health trends provide important information to estimate need for future medical, social, and long-term care resources. With average life expectancy increasing for older adults, one currently important late-life health issue is to prevent late-life

disability (Guralnik, Fried & Salive, 1999).

Late-life disability has been approached from demographic, epidemiologic, and sociological points of view. One major issue is to elucidate social determinants. There are many studies which show socioeconomic status (SES) disparities in late-life disability, not only in various Western counties such as Denmark (Avlund, Damsgaard & Osler 2004), England (Grandy & Glaser, 2000), Finland (Rahkonen & Takala, 1998), Italy (Huisman et al., 2005), Netherland (Huisman et al., 2005), and the U.S. (Taylor 2010), but also in some Asian countries, including China (Liang, Song, Du, Guralnik & Qiu, 2015) and Japan (Liu, Liang, Muramatsu & Sugisawa, 1995). Another issue concerns whether late-life disability increases, remains stable, or decreases over time.

Improvement of late-life disability after the 1980s has been reported not only in various Western countries such as the Netherlands (Puts, Deeg, Hoeymans, Nusselder & Schellevis, 2008), Finland (Sulander et al., 2006), Spain (Sagardui-Villamor, Guallar-Castillon, Garcia-Ferruelo, Banegas & Rodriguez-Artalejo, 2005), Sweden (Parker, Schön, Lagergren & Thorslund, 2008), and the U.S. (Freedman & Martin, 1998; Freedman, Martin & Schoeni, 2002; Lin, Beck, Finch, Hummer & Master, 2012) but also in a few Asian countries, such as China (Liu, Chen, Song, Chi & Zheng, 2009), Japan (Schoeni et al., 2006) and Korea (Jang, Cho & Kawachi, 2010), although a flattening or reverse trend during the years after 2000 has been noted in some countries (Freedman et al., 2013; Lin et al., 2012; Parker et al., 2008). In addition, more recent studies in the U.S. have reported differences in late-life disability across birth cohorts and indicated that late-life disability has been increasing among newer birth cohorts (Lin et al., 2012; Seeman, Merkin, Crimmins & Karlamangla, 2010).

Studies investigating the role of SES disparity trends in late-life disability over age, time, and birth cohorts are politically important. Moreover, age, period, and cohort trends in SES disparities in late-life disability are theoretically interesting. There are two conflicting hypothesis to explain how SES disparities in health change with age. The age-as-leveler theory hypothesizes a possible decreased association between SES and health in later life, which is explained by biological frailty and selective mortality (Dupre, 2007; Lynch, 2003). The accumulative theory hypothesizes an increased association between SES and health in later life due to the accumulation of risk factors with aging (Dupre, 2007; Lynch, 2003). In terms of period effects, the traditional perspective on the health impact of economic fluctuations holds that recessions have a negative relationship with health, especially for lower SES groups (Edwards, 2008). In terms of cohort effects, according to Easterlin (1987), a large cohort has more people completing their schooling and entering jobs, which leads to negative socioeconomic achievements and negative psychological well-being. It is to be expected that competition for jobs, reduced opportunities for promotions and a tight labour market would be more strongly emphasized in large, rather than in small cohorts, giving the impression that these factors are more detrimental to lower income groups when large cohorts are studied. On the other hand, Lynch (2003) points out that influences of SES will be greater in younger cohorts due to a stronger return from education. As changes in economic conditions and cohort sizes have been observed for over thirty years (Jeon & Shields, 2005; López-Casasnovas & Soley-Bori, 2014), it is possible that the influences of SES disparity trends in late-life disability change over time, or the birth cohort.

Certain studies have investigated differences in SES disparities in late-life disability by each age, period, and cohort. For example, a study conducted in the U.S. demonstrated that education-based differences in multidimensional health, including disabilities, converge in later old age (Xu, Liang, Bennett, Botoseneanu & Allore, 2014). Certain studies have examined whether SES disparities increase disabilities in late-life over a period, although the findings of these studies have been inconsistent (Sulander et al., 2006; Crimmins & Saito, 2001; Schoeni et al., 2005; Schoeni et al., 2006). One study that examined SES-related disparities in late life disability across birth cohorts reported that SES disparities in late-life disability have increased in newer birth cohorts (Morciano, Hancock & Pudney, 2015). Previous studies on period and birth cohort differences in SES disparities in late-life disability have been constrained by three limitations. First, few studies have simultaneously examined the influences of Age-Period-Cohort (A-P-C) variables, despite the suggestion that partial analysis of these three dimensions could result in biased estimations (Yang, 2011), for example, because it would be difficult to distinguish between period and cohort effects by comparing data from multiple time periods for the same age group. Second, although certain studies have examined period changes in SES disparities related to late-life disability, only a few studies have attempted to statistically explain period changes in SES that are related to health differences on the basis of macroeconomic trends. Third,

studies on SES disparities in late-life disability are scarce, although many studies on SES health disparities in Japan have been published since 2000 (Kagamimori, Gaina & Nasermoaddeli, 2009). In addition to the studies by Schoeni et al. (2006), only a few other studies have noted that SES variables such as education have a significant effect on onset of disability or trajectory of body weight (Liu et al., 1995; Yong & Saito, 2012). It remains unclear whether findings obtained from older adults mainly in Western countries have validity in a Japanese context. Japan, as another industrialized nation, provides an opportunity to examine the external validity of SES disparities in late-life disability across A-P-C identified in Western countries.

The present study examined possible SES disparities in late-life disability across A-P-C, using a repeated cross-sectional survey of a nationally representative sample in Japan. The main focus of our study was to estimate the independent influences of age, a broader range of period, and birth cohort, while simultaneously controlling for each A-P-C dimension. In addition, if large variations in periods or cohorts were observed, we sought to further examine the extent to which exogenous conditions at each time period, or cohort could explain the trends in that period, or cohort, across periods and cohorts

2. Methods

2.1. Data

The Comprehensive Survey of the Living Conditions (CSLC) was used in this study. The CSLC is a repeated nationwide cross-sectional survey of households and household members, conducted by the Ministry of Health, Labour, and Welfare of Japan to obtain basic statistical data on citizens. This large-scale survey is conducted every three years. Each CSLC has been conducted according to the same methods. The CSLC started in 1986, and the most recent survey has been conducted in 2013. In the 2013 survey, samples were whole households and household members living in 5530 area units randomly selected from the National Census. Trained investigators visited households to distribute and collect the self-administered questionnaires. The total number of households included in the basic information survey was 295,367. Survey items include information about the household (e.g., gender, age, presence of a spouse, and working status) and a health questionnaire (e.g., subjective symptoms, disability, and working status). Questionnaires for conducting the basic information survey were collected from 235,012 households (The response rate was 79.6%). Of the total number of households which selected for the sample, 36,419 households were selected at random and data were collected regarding income and savings. In questions regarding income, household members were asked to indicate their income according to categories such as the employee, the business, and property in units of 10,000 from January to December last year. Questionnaires regarding income and saving were collected from 27,081 households (The response rate was 74.4%). Neither the basic information survey nor the income and saving survey specified a particular person in the households that was expected to complete the questionnaire. As a result, no information was collected regarding who responded to the questionnaires. We used micro-data files from each three-year survey conducted between 1989 and 2013.We excluded the 1986 survey, because it did not use the same questions for measuring disability that had been used in surveys since 1989.

2.2. Study variables

2.2.1. Dependent variables

In this study, disability was assessed as a self-reported limitation by using the Basic Activities of Daily Living (BADL) scale (Ormel, Rijsdijk, Sullivan, Van Sonderen & Kempen, 2002). The actual question that was used to assess disability was "Do you have any difficulties with daily living caused by health problems?" Response options were "yes" or