Income inequality, area-level poverty, perceived aversion to inequality, and self-rated health in Japan[☆]

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ABSTRACT

In this study we conduct a multilevel analysis to investigate the association between regional income inequality and self-rated health in Japan, based on two nationwide surveys. We confirm that there is a significant association between area-level income inequality and individual-level health assessment. We also find that health assessment tends to be more sensitive to income inequality among lower income individuals, and to degree of area-level poverty, than income inequality for the society as a whole. In addition, we examine how individuals are averse to inequality, based on the observed association between inequality and self-rated health.

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Introduction

The relationship between income inequality and health has been one of the central issues in social epidemiology, and a rich literature examines it empirically. Following an influential paper by Wilkinson (1992), who showed that a more economically unequal society has a shorter life expectancy, ecological studies have pointed to a relationship between income inequality and poor health.

More recently, however, it has become widely recognized that an analysis based solely on area-level data likely fails to disentangle the effects of individual income, gender, education and other factors from the pure effects of area-level income inequality. To address this issue explicitly, many attempts at multilevel analyses have used multilevel data in the form of individual-level health outcomes, sets of individual-level socioeconomic predictors, and area-level income inequality measures (Subramanian, Kawachi, & Kennedy, 2001).

As comprehensively surveyed by Subramanian and Kawachi (2004) and Wilkinson and Pickett (2006), previous multilevel studies have obtained mixed results, and it is difficult to identify which factors explain their differences. Indeed, a substantial number of studies conducted in the United States point to an association between wide income inequality and poor health, while the results of studies conducted outside the United States tend not to support the income inequality hypothesis.

More generally, there has been no consensus as to why regional inequalities affect health status. In fact, a wide variety of control variables have been used, and it is difficult to distinguish between genuine confounders and mediators (Wilkinson & Pickett, 2006). One interpretation emphasizes the stratified access to tangible material conditions, while another interpretation emphasizes the effects of stress stemming from living in an unequal society (Kawachi, Subramanian, & Almeida-Filho, 2002). These two interpretations are not mutually exclusive, nor is it possible to distinguish their effects from one another.

When it comes to empirical studies in Japan, Shibuya, Hashimoto, and Yano (2002) offered what is, to our knowledge, the first attempt to perform a multilevel analysis using nationwide data. Using micro-data from the 1995 Comprehensive Survey of Living Conditions of People on Health and Welfare (CSLCPHW), they found no significant relationship between regional income inequality and

self-rated health. It is premature, however, to conclude that income inequality is not a factor in health assessment in Japan, because the authors did not control for various factors that are potentially important but not available from the CSLCPHW. In addition, to our knowledge there has been no multilevel analysis in Japan since Shibuya et al. (2002), making it impossible to conduct any cross-country comparison.[1]

Japan may be considered a relatively homogeneous society, with low levels of inequality. In reality, however, the Gini coefficient for Japan is now higher than the OECD average, and the ratio of people with income below the poverty line, which is half of the mean income, ranks in the highest group among OECD member countries (Förster & Mira d'Ecorle, 2005). In addition, many researchers raise concerns about Japan's trend of widening income inequality (Fukawa & Oshio, 2007; Tachibanaki, 2005). An empirical analysis of the relationship between income inequality and health will potentially have important implications for health-care policy as well as income redistribution.

In this paper, we conduct a multilevel analysis in Japan. We follow the initial analysis of Shibuya et al. (2002), but extend it in three ways, not only to make the Japanese case more comparable with those of other developed countries, but also to provide new aspects of multilevel analysis.

First, we control for a broad set of factors at both individual and prefecture levels and examine how they affect the observed association between regional income inequalities and self-rated health. In particular, we include individual- and area-level social capital and area-level health capital, both of which can be considered either confounders or mediators. Indeed, there is no rigorous theory that can identify their characteristics, which must be examined by empirical analysis.

To this end, we present estimation results based on one-by-one and step-by-step modeling from non-adjusted to fully adjusted models, as illustrated by Subramanian and Kawachi (2004). This is important because the results have been heterogeneous among studies using various data, variables, and modeling strategies. We examine changes in the value and statistical significance of the odds ratio for reporting poorer health with a sequentially cumulative inclusion of different factors.

Second, we attempt to provide a more precise measurement of income inequality. Most previous studies used the Gini coefficient. This measure is easy to understand, and Kawachi and Kennedy (1997) showed that the choice of inequality measures does not affect the relationship between income inequality and health. It might be the case, however, that for self-rated health, it is inequality at the lower end of income distribution or the degree of area-level poverty that matters, rather than overall inequality. We attempt to determine the effect of the choice of inequality measures on the results.

Specifically, we assess six inequality and poverty measures: (i) Gini coefficient, (ii) mean log deviation (MLD), (iii) squared coefficient of variation (SCV), (iv) 90P/10P ratio, (v) 50P/10P ratio, and (vi) 90P/50P ratio. It is widely known that the Gini coefficient is especially sensitive to the middle of the distribution, while the SCV and the MLD are more sensitive to the top and bottom ends of the distribution, respectively. The 50P/10P and 90P/50P ratios capture income disparity among lower income and higher income individuals, respectively. In addition to these measures, we use some conventional poverty indices (Foster, Greer, & Thorbecke, 1984) to examine how self-rated health is sensitive to area-level poverty as opposed to overall inequality.

Third, we apply the notion of inequality aversion to the association between income inequality and self-rated health. Most of the literature discusses the health effects of income inequalities; however, the attitudes toward inequalities seem to be equally important. While both interpretations are consistent with the data, we attempt to examine explicitly how the peoples' concerns regarding inequalities affect self-rated health, instead of using the inequality measure as an explanatory variable.

In measuring inequality aversion, we faced the challenge of the heretofore nonexistence of an aggregated indicator at prefecture level. To resolve this, we construct a synthetic measure of social welfare, as proposed by Atkinson (1970), based on an assumed degree of inequality aversion, and search for its most plausible value, maintaining consistency with observed self-rated health. Social welfare, which is a key concept in welfare economics, is assumed to be determined by both levels and distribution of income (see for example, Atkinson & Stiglitz, 1980, chap. 11; Cowell, 2000, for the theoretical background). A higher level of mean income enhances social welfare per se. Simultaneously, the more inequality averse individuals are, the lower they evaluate a society of unequal distribution. This means that the social welfare function is concave in terms of income; the degree of concavity corresponds to the degree of inequality aversion. We roughly estimate the degree of inequality aversion, based on the observed association between income distribution at a prefecture level and self-rated health.

Data and analytic strategy

Data

We utilize two nationwide surveys, the 2004 CSLCPHW and the 2003 Japanese General Social Survey (JGSS). CSLCPHW includes a large sample, and is suitable for calculating regional income distribution; however, it does not contain detailed information about the socioeconomic background of each respondent. JGSS is a relatively compact survey, but provides comprehensive and detailed information about the attitudes and behavior of each respondent. Thus, these two nationwide surveys complement one another.

From the CSLCPHW, we calculate inequality and other measures related to prefecture-level income distribution and poverty in 2003, one year before the survey year. The CSLCPHW is one of major official nationwide surveys and is compiled by the Ministry of Labor, Health and Welfare of the Japanese government. It has been used not only by the Japanese government, but also by the OECD as a main data source to calculate income inequality and poverty measures in Japan.

The CSLCPHW randomly selected 2000 districts from the Population Census divisions, which were stratified in each of 47 prefectures according to population size. Then, all households in each district were interviewed and asked questions about the household and its members. The original sample size of the 2004 Survey was 72,485 individuals, who were members of 25,091 households (with a response rate of 70.1 percent).

In this survey, we collected information on household income to calculate income inequality measures and median income for each of 47 prefectures. While both pre-tax and post-tax household incomes are available from the CSLCPHW, we focus on pre-tax household following Shibuya et al. (2002).[2] As in most previous studies, we

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[1] Nakaya and Dorling (2005) compared the relationship between income inequality and age-grouped mortality in Britain and Japan. They revealed that, in Britain, mortality is lower where income inequality is lower, while there is no obvious correlation in Japan. However, their analysis was limited to the relationship between area-level aggregated data on mortality and income inequality.

[2] Using post-tax incomes, we obtain virtually the same pattern of estimation results, although the statistical significance of the coefficients for inequality and poverty measures turned out to be somewhat smaller.