



Socioeconomic status and health in the Japanese population

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ABSTRACT

There is growing interest in the influence of socioeconomic status (SES) on health. Individual SES has been shown to be closely related to mortality, morbidity, health-related behavior and access to health care services in Western countries. Whether the same set of social determinants accounts for higher rates of mortality or morbidity in Japan is questionable, because over the past decade the magnitude of the social stratification within the society has increased due to economic and social circumstances. SES must be interpreted within the economic, social, demographic and cultural contexts of a specific country. In this report we discuss the impact of individuals' socioeconomic position on health in Japan with regard to educational attainment, occupational gradient/class, income level, and unemployment.

This review is based mainly on papers indexed in Medline/PubMed between 1990 and 2007. We find that socioeconomic differences in mortality, morbidity and risk factors are not uniformly small in Japan. The majority of papers investigate the relationship between education, occupational class and health, but low income and unemployment are not examined sufficiently in Japan. The results also indicate that different socioeconomic contexts and inequality contribute to the mortality, morbidity, and biological and behavioral risk factors in Japan, although the pattern and direction of the relationships may not necessarily be the same in terms of size, pattern, distribution, magnitude and impact as in Western countries. In particular, the association between higher occupational status and lower mortality, as well as higher educational attainment and either mortality or morbidity, is not as strongly expressed among the Japanese. Japan is still one of the healthiest and most egalitarian nations in the world, and social inequalities within the population are less expressed. However, the magnitude of the social stratification has started to increase, and this is an alarming sign.

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Introduction

Socioeconomic circumstances seriously affect health and well-being, making health inequalities a major public health concern around the world (Marmot, 2001). In developed countries, the health inequality issue is transforming from documentation into materialized policies aimed at reducing health inequalities. Socioeconomic status (SES), defined as access to material, human and social capital, represents one of the fundamental bases of health. Education, employment and income are among the most powerful components of SES, and by employing all of these components we can create the most informative image of SES. The importance of each component may differ between and within countries and cultures (Smith, 2000). Socioeconomic disparities in health do not follow a simple explanation; pathways by which SES affects health

can be expressed by differences in access to health services, exposure to occupational hazards and environmental pathogens, low levels of social support and social capital, poor social policy, the cumulative effects of stress and differences in health risk behaviors. During the past several years, unemployment has become a serious issue in the Japanese context, and we have also included unemployment as a separate chapter.

The purpose of this review is to describe and summarize the evidence about the current relationship of SES and health, to unite and discuss the existing evidence, identify the main subtopics, and to provide a vision for future research because we were unable to locate an English-language review of SES and health in Japan published within the last decade. Due to major social, economic, demographic and cultural changes, social inequalities have started to increase. This situation is not described properly in the scientific literature, although some tendencies are already visible.

Japan possesses specific characteristics, like universal medical insurance, an intense work environment (far longer working hours than the prescribed 40 h per week), relatively low exposure to

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environmental hazards, specific characteristics of socialization and social support/network, a particular distribution of health risk behavior, and unique population characteristics (increasingly aging society, ethnic homogeneity, etc.). Also, cultural capital, which is a key element in the behavioral transformation of social inequality into health inequality (Abel, 2008), is high in the Japanese population. All of these factors contribute a specific effect to the SES and health relationship, which is not homogeneous. It has been reported that individual SES, as measured by educational level, occupational class and income, is closely related to both mortality and morbidity and access to health care services (Graham, 2000; Marmot & Wilkinson, 2005) in Western countries. Whether the same set of social determinants accounts for higher rates of mortality or morbidity in Japan is still questionable.

Social inequalities in health may be due to the cumulative effects of disadvantage across the life course. The life course perspective enables us to see the coevolution and interconnections of social position and health (van de Mheen, Stronks, Schrijvers, & Machenbach, 1998). The life course perspective on health and its social determinants sees a person's biological status through the structured nature of complex social processes as a marker of their past and present social position. The life course may be regarded as a combination of interacting biological and social elements. Individual biological development takes place within a social context that structures life changes so that advantages and disadvantages tend to cluster cross sectionally and accumulate longitudinally. Exposure to one environmental hazard is likely to be combined with exposure to other hazards, and these exposures are likely to accumulate over the course of life (Blane, Bartley, & Davey Smith, 1997).

Accelerated economic growth and technological advancement have enhanced health and life expectancy in Japan. It seems that Japan's health expenditure and health and welfare system organization, along with specific social and cultural particularities, translate into reduced socioeconomic differences in health outcomes for its population. However, there have been recent serious concerns relating to increasing levels of social and health disparities, which, while not strongly expressed at this moment, exhibit an increasing tendency partially caused by population aging.

Japan has entered a period of breakdown of its traditional social structure. After the collapse of the economic bubble and economic restructuring (with stagnation or recession in some areas), it seems that socioeconomic inequalities have increased, and there is also a social crisis with some negative implications in terms of human relations and for society in general. Elements such as a performance/contract based payment system (instead of lifelong employment), consumerism and materialism, a stressful and rigidly competitive education system, the decline of extended families and familial traditions, a rapidly aging society, lack of socialization, high urbanization and spatial isolation, a decrease in traditional social solidarity and reciprocity, and a high level of media/digital influence (which often excludes verbal communication) definitely contribute to social dysfunction and represent specific Japanese social characteristics (human interactions) that possess a significant impact on social gradients and inequalities (Tachibanaki, 1998). Interestingly, some new phraseologies describe the situation perfectly, e.g.: “*wa-kinngu pua*” those who have employment (temporary or less probably permanent) but remain in relative poverty due to a low salary; “*makeinu*” (loser; or literally losing dog) describes those who reject or delay marriage or couples who have no children; “*furita*” (parasite single) describes someone between a drifter and a temporary worker who does not aspire to a permanent job; “*hikikomori*” (pull inside) describes those who will rarely or never leave their home or bedroom for an extended

period. Social dysfunction is significantly influenced by economic factors, and the typical Japanese worker “*sarari-mann*” who used to believe that the employment situation was secure for life is now frustrated and disoriented because, according to new rules, no one is irreplaceable and promotion is merit based. In the Japanese context, *social causation serves as the first explanation for health disparities*. Even though social inequalities between various population groups are still less expressed in comparison to Western countries, the magnitude of the social stratification seems to increase year by year (www.nri.co.jp/english/opinion/papers/2007/pdf/np2007124.pdf).

When we speak about explanatory factors for social inequalities in Japan, it is important to mention that when viewed from the outside, Japan is still a high-performing country with an egalitarian society and secure job system (in comparison with other countries, especially in the West), but when viewed from inside, we are no longer an egalitarian society and our performance (economic, social, demographic, etc.) is on the decline.

For this narrative review, we screened indexed papers in Medline/PubMed from 1990 to 2007 for representative, population based, national or large cohort (at least 1000 participants), longitudinal, case-control, cross sectional or ecological studies on the association between SES and health in Japan. Also included were reports published before 1990 only if they proved to have high influence on further research in the area. Key words in the studies were: *socioeconomic status, social gradient, education, income, occupational class, unemployment, health inequalities and Japan*. Papers were included if they: primarily used more than one valid socioeconomic indicator (see key words); were written in English or Japanese; were representative and published in a peer-reviewed journal. Out of approximately 738 hits, 45 references focused on the Japanese population were used (see Tables 1–4).

In this report, we present the impact of individuals' socioeconomic position on health with regard to educational attainment, occupational gradient/class, income level, and unemployment.

Educational attainment

The main advantages of using educational attainment as an indicator of socioeconomic status are that it is easily recorded and remains stable over an individual's lifetime (Zurayk, Halabi, & Deeb, 1987). Those who are more educated have higher incomes and better health, work in higher positions, possess more wealth, and have lower disability and mortality risks than their lower SES counterparts. Education shapes future occupational opportunities and earning potential and provides knowledge and skills that allow better-educated persons to gain better access to information and resources to promote health.

According to Mirowsky and Ross (2003), increasing educational attainment improves health by increasing individual agency, self-efficacy, and problem-solving capacity, all of which promote a healthy lifestyle. In addition, educational level is less likely to be affected by health impairments that develop in adulthood compared to other indicators of socioeconomic position, such as occupation or income (Berkman & Kawachi, 2000). In Japan, the average amount of schooling completed is 12.3 years per person, more than 90% of the population attends high school, and around 40% of all upper-secondary school graduates advance to tertiary education. The education level in Japan presents an increasing tendency; for example, among OECD countries, Japan is ranked in the 10th position in the 55–64-year range (those who completed their education some 40 years ago) and in 3rd position in the 25–34-year range (those who completed their education a decade ago) (www.oecd.org/dataoecd). This factor has a direct implication for SES. Specifically, for Japan, *educational attainment in the younger*

Table 1
Studies on the association of educational attainment and health in Japan.

Author	Health condition	Type of study
Fukuda et al. (2004a, 2004b)	Higher all-cause mortality with stronger association in men	Ecological
Fukuda et al. (2004a, 2004b)	Higher all-cause mortality	Ecological
Fujino, Iso, et al. (2005), Fujino, Mizoue, et al. (2005), Fujino, Tamakoshi, et al. (2005)	Increased overall risk of death in men and women, increased risk of death from cancer and external causes	Prospective cohort
Fujino et al. (2002)	Ischemic heart disease risk marginally reduced	Prospective cohort
Martikainen et al. (2001)	Increased risk of stomach cancer	Prospective cohort
Kagamimori (1979)	Higher high-density lipoprotein cholesterol, lower body mass index, and lower waist-to-hip ratios	Cross sectional
Liang et al. (2002)	Inversion of social gradient over years	Ecological
Nishi et al. (2005)	At advanced age, those less educated live longer than those with a higher educational level	Prospective cohort
Abe and Moritsuka (1986)	Higher percentage of subjects with low education in areas of high mortality rate from suicide	Ecological
Nishi et al. (2004)	Higher climacteric symptoms and complaints of severe symptoms	Case-control
Anzai et al. (2000)	Higher smoking rate in both men and women and higher diabetes rate in men	Cross sectional
Ishizaki et al. (2000)	Longer sleeping hours in men and women and higher BMI in women	Cross sectional
Nomura et al. (2005)	Increased age-adjusted plasma fibrinogen level	Cross sectional
	Health dissatisfaction	Cross sectional

generations represents a better social indicator than income, and employment grade may be an important indicator of socioeconomic status in the middle-aged population. According to Tachibanaki (Tachibanaki, 1998), due to the extremely high popularity of higher education, especially over the last few decades, the range of levels of education attained has become larger, which has increased social inequalities in Japan. On the other hand, many aging Japanese enroll in various education facilities, and this factor could also influence SES, although studies on this topic have not yet been performed.

Several studies have investigated the relationship of educational attainment and health in Japan. A nationwide ecological study on municipal socioeconomic status (SES) and mortality suggested that a lower SES was related to higher mortality. The mortality gradient was steeper for the under 75-year-old population than the total and over 75-year-old population, and the relationship between mortality and the education-income index was stronger for males than for females (Fukuda, Nakamura, & Takano, 2004a, 2004b). The authors concluded that sex differences in the association between mortality and municipal SES are due to substantially different patterns in the main causes of death between males and females.

Fujino et al. (Fujino, Iso, et al., 2005; Fujino, Mizoue, Tokui, & Yoshimura, 2005; Fujino, Tamakoshi, et al., 2005) examined the association between educational level and major causes of death in

a prospective cohort study. A baseline survey was conducted between 1988 and 1990 among 110,792 individuals aged 40–79 years in 45 areas. The results suggested that individuals with low levels of education had an increased overall risk of death (16 and 26% increased risk for men and women, respectively). Increased risks of death were also observed for cancer (17 and 10%) and for external causes (81 and 78% for men and women, respectively). Lower levels of education can lead to insecure income, hazardous work conditions, and poor housing, which can increase the risk of death due to external causes. Educational level was also associated with the risk of stomach cancer in Japan (Fujino et al., 2002). The more highly educated group showed a consistent 28% decrease in the risk of stomach cancer. However, ischemic heart disease risk was marginally reduced in less educated men (23%). Previous studies in Western countries have revealed that a lower level of education is associated with an increased risk of ischemic heart disease (Bobak, Murphy, Rose, & Marmot, 2003; Kilander, Berglund, Boberg, Vessby, & Lithell, 2001). This inconsistency may partly result from differences between Japan and other countries in the association between socioeconomic differences and behavioral and biomedical risk factors for ischemic heart disease (Kilander et al., 2001).

Martikainen et al. (Martikainen, Ishizaki, Marmot, Nakagawa, & Kagamimori, 2001) compared socioeconomic differences in

Table 2
Studies on the association of occupational class, gradient and health in Japan.

Author	Health condition	Type of study
Martikainen et al. (2001)	Higher high-density lipoprotein cholesterol, lower body mass index	Cross sectional
Fukuda et al. (2005a)	Excess deaths due to injury and suicide increased from 1973–1977 to 1993–1998	Ecological
Martikainen et al. (2004)	Small association with poor physical functioning among non-manual employees, poorer perceived health and physical functioning in men with manual jobs	Cross sectional
Sekine et al. (2006)	Poorer sleep quality and self-reported health than in higher grade employees	Cross sectional
Hu, Sekine, Gaina, & Kagamimori (2007), Hu, Sekine, Gaina, Nasermoaddeli, et al. (2007)	Poor sleep associated with lower grade of employment	Cross sectional
Morita et al. (2007)	Social gradient in periodontal status	Cross sectional
Schrijvers and Mackenbach (1994)	Small or no association with cancer survival	Review
Kawaharada et al. (2007)	Occupational stress differs by occupational class	Cross sectional
Fukuda, Nakamura, Takano, Nakao, et al. (2007)	Notable socioeconomic differences in cancer screening	Cross sectional
Sakuta and Suzuki (2005)	Current cigarette smoking, poorer vegetable consumption, higher prevalence of type 2 diabetes and higher white blood cell counts	Cross sectional
Fukuda et al. (2005b)	Higher likelihood of health risk behaviors in men and women	Cross sectional
Takashima et al. (1998)	Higher proportion of hypertension and higher BMI for personnel in “transport”, “clerical”, “managerial”, and “professional” categories	Cross sectional
Takao et al. (2003)	Higher physical activity in male intermediate occupational class (clerks) than managers and blue-collar workers	Cross sectional
Kawakami et al. (2004)	Higher occupational gradient in job strain and job insecurity in women workers	Cross sectional
Ishizaki et al. (2006)	Sickness absence associated with low occupational class	Cross sectional
Fukuda, Nakamura, and Takano (2007)	Deprivation index representing socio-economic conditions	Ecological

Table 3

Studies on the association of income and health in Japan.

Author	Health condition	Type of study
Bassino (2006)	Physical stature, income and health	Ecological
Cockerham and Yamori (2001)	Social gradient is not applicable in specific area of Japan (Okinawa)	Cross sectional
Araki (1986)	Predisposing factor for neoplasms of the uterus and lung	Ecological
Araki and Murata (1986)	Predisposing factor for stillbirth	Ecological
Asada and Ohtsuka (2004)	Slight increase in health-related quality of life measured by Gini coefficient	Cross sectional
Shibuya et al. (2002)	Higher likeliness to perceive own health as the worst	Cross sectional
Yamazaki et al. (2005)	Lower self-reported quality of life in men	Cross sectional
Fukuda et al. (2005a, 2005b, 2005c, 2005d)	Mortality gradient and excess deaths due to injury and suicide for both men and women	Ecological
Fukuda et al. (2005a, 2005b, 2005c, 2005d)	Health expectancy at 65 years significantly positively correlated with per capita income	Ecological
Wang et al. (2005)	Strong association with self-reported fair or poor health in middle-aged and elderly men	Cross sectional
Fukuda et al. (2005d)	Higher smoking tendency in all age groups in men and women, except in men aged 18–24 years	Cross sectional

behavioral and biomedical risk factors in Japanese and English cohorts of middle-aged men. They found that more highly educated men in Japan had lower high-density lipoprotein cholesterol (HDL) levels, higher body mass indices (BMI), and higher waist-to-hip ratios than less educated men, but the opposite associations were found among men in England. However, the authors cautioned about the generalization of their findings to national populations because the cohort consisted of employed men who were recruited in workplaces and regions that may not be generally representative of the country.

It has been reported that mortality due to diabetes mellitus has changed the direction of the social gradient over time. In the UK, mortality was higher in the higher social class around 1921, but gradually shifted to the lower social class by 1971. The same tendency in social gradients has been observed to a lesser degree in the Japanese population for some disorders. When discussing the influence of SES on health, the changes in trends over the years should be taken into account (Kagamimori, 1979).

In a study of 2200 elderly Japanese, Liang et al. reported that in contrast to Western countries, an educational crossover effect on mortality was observed among old men such that at advanced age, those with less education live longer than those with more education. They also reported that educational differences in the risk of dying tend to converge in the 70–79 year age group. The observation that the educational crossover exists only among elderly men may be due to gender and SES differences in causes of death, morbidity and health behavior. The authors also confirmed, in the Japanese context, the thesis that the effect of SES on health is small in early adulthood, greatest in middle and early old age, and relatively small again in late old age. However, this research did not provide support for the hypothesis on the cumulative advantage of education (Liang et al., 2002).

Nishi et al. (Nishi et al., 2005) reported that in northern Japan, where standardized mortality ratios (SMRs) from suicide were higher in comparison to the Japanese standard rate, the percentage

of those with nine years or less of education was significantly higher in the high SMR area for both men and women.

A case-control study with 282 cases and 639 controls aged 40–59 years revealed that the rate of climacteric symptoms and complaints of a severe symptom type among those with an education limited to junior high school or under was 2.4 times larger than that among those with an education greater than or equal to senior high school (Abe & Moritsuka, 1986). Other socio-economic indicators were not associated with climacteric symptoms.

The effects of educational attainment on health can be partly explained through health behaviors. There is evidence of an inverse association of education and smoking (Nishi, Makino, Fukuda, & Tataru, 2004). In comparison to male university graduates, there was a 96 and 107% greater chance of smoking in those who had graduated from high school or only junior high school, respectively. Higher chances of smoking were also observed in women with lower educational levels. Diabetes was also inversely associated with educational level in men (Nishi et al., 2004). Previous findings from a cohort study identified smoking as a risk factor for type 2 diabetes (Nakanishi, Nakamura, Matsuo, Suzuki, & Tataru, 2000), and therefore, the significant inverse relationship between diabetes and education might be partly explained by the association between smoking and education. As for alcohol drinking, the relationship with educational level is inconsistent.

Anzai et al. (Anzai, Ohkubo, Nishino, Tsuji, & Hisamichi, 2000) investigated the relationship between educational level and smoking, drinking, BMI, sleeping, exercise, breakfast, and snacks. They found that higher education was associated with shorter sleeping hours for both men and women and lower BMI for women. In age groups younger than 70 years, people with higher education tended to exercise more. However, smoking for women and alcohol consumption were not related to educational level. Similarly, in a sample of 1439 Japanese civil servants, lower education level, age and negative affect balance scale, but not grade of employment,

Table 4

Studies on the association of unemployment and health in Japan.

Author	Health condition	Type of study
Nagata (2000)	Increasing job stress	Cross sectional
Fukuda et al. (2004a, 2004b)	Association of all-cause mortality and unemployment strengthened from 1973–1998 period	Ecological
Fujino, Iso, et al. (2005), Fujino, Mizoue, et al. (2005), Fujino, Tamakoshi, et al. (2005)	Higher risk of death from cerebrovascular disease in employed men compared with self-employed	Prospective cohort
Fujino, Iso, et al. (2005), Fujino, Mizoue, et al. (2005), Fujino, Tamakoshi, et al. (2005)	No association of unemployment with the risk of suicide death	Prospective cohort
Abe et al. (2004)	Unemployment correlated to the suicide method of hanging	Ecological
Matoba et al. (2003)	Recently unemployed people kept their health and daily lifestyle in good condition for a period of 2 years	Prospective cohort
Takano et al. (1999)	Higher morbidity rates than the general population in homeless men (not all subjects were unemployed)	Cross sectional

presented independent positive relationships with smoking only in men (Hu, Sekine, Gaina, & Kagamimori, 2007; Hu, Sekine, Gaina, Nasermoaddeli, & Kagamimori, 2007).

Ishizaki et al. (Ishizaki, Martikainen, Nakagawa, & Marmot, 2000) reported that low employment grade and low educational background were associated with increased age-adjusted plasma fibrinogen levels in workers in a metal-products factory. In agreement with this finding, Davey Smith et al. (Davey Smith et al., 1998) found that education had a stronger association with cardiovascular mortality than occupational social class.

Insomnia has been found to be an independent contributor to health dissatisfaction (Nomura, Yamaoka, Nakao, & Yano, 2005). A multivariate regression analysis showed that the socio-demographic characteristics that significantly influenced health dissatisfaction in Japan included older age and low education level.

Comparative analyses of data for Japan and England reveal that important differences in the social patterning of biological risk factors exist, and therefore, the contribution that these risk factors make in explaining social differences in health may vary accordingly. From the health promotion point of view, improving the education of the younger generation will result in increasing human capital: higher productivity, augmentation of lifetime earnings and improvement in the socialization of the next generation, thereby decreasing social disparities.

Occupational class and gradient

Published studies indicate that socioeconomic differences in mortality, morbidity and risk factors are not uniformly smaller in Japan than in other countries, but the magnitude and pattern of these inequalities is not as consistent as in Western countries (Kagamimori, Iibuchi, & Fox, 1983; Kagamimori, Matsubara, Sokejima, Sekine, & Matsukura, 1998; Kawakami, Haratani, Hemmi, & Araki, 1992). In England, higher employment grades were advantaged with regard to several biological risk factors, such as diastolic blood pressure, BMI, and plasma fibrinogen. In Japan, the picture was different in that higher grades had higher BMI and lower HDL cholesterol (Martikainen et al., 2001). A recent ecological study in Japan investigated the socioeconomic inequality in regional mortality by cause of death (Fukuda, Nakamura, & Takano, 2005a). They examined the relationship between mortality from selected major causes and SES of the area between 1973–1977 and 1993–1998 in the population aged 0–74 years and found that mortality gradient by SES and excess deaths due to injury and suicide in the lower SES groups markedly increased from 1973–1977 to 1993–1998 for both males and females. As for coronary heart disease, they showed a smaller impact of heart disease and a negative impact of coronary heart disease on the socioeconomic inequality in regional mortality. The small contribution was attributed to the lower mortality from heart disease in Japan in comparison to Western countries (WHO, 1996), in addition to a non-significant relationship between SES and mortality from the disease (Fukuda, Nakamura, & Takano, 2005b, 2005c, 2005d). Furthermore, the weak relationship between individual SES and risk factors for coronary heart disease such as smoking in the Japanese population (Nishi et al., 2005) was suggested as a plausible explanation for the weak relationship between SES and mortality from coronary heart disease. Future investigations must be undertaken because mortality changes could result from health behavior changes.

Martikainen et al. (Martikainen et al., 2004) studied the patterns of socioeconomic inequalities in physical functioning and perceived health among government employees aged 40–60 years in Britain, Finland and Japan with standardized health questionnaires. For poor physical functioning, a typical Western pattern of health

inequalities emerged among Finnish and British men with non-manual jobs. However, in the Japanese cohort, the differences were smaller and less systematic among non-manual employees. Among Japanese women, the differences between non-manual occupational grades were inconsistent. Poorer physical functioning in the lower non-manual grades was observed in the Finnish and British cohorts for women. In Japan, men in manual employment had poorer perceived health and poorer physical functioning than non-manual men, as seen in the Finnish and British cohorts. However, the poorer health of Japanese manual women was less clear. The authors suggest that analyses of socioeconomic inequalities in women's health in Japan, which has a "conservative" welfare regime, may be better carried out using household-based measures of socioeconomic status, such as household income or the socioeconomic status of the householder.

Recent findings from a cross sectional study on 3684 government employees aged 20–65 years in Japan showed that in men, higher grade employment was associated with better sleep quality and better self-reported health (Sekine et al., 2006). The authors suggested that the grade differences in sleep quality contributed to the health inequalities. However, there were no significant grade differences in sleep quality among women. In male Japanese civil servants, poor sleep quality was associated with lower grade of employment, lower control, higher job demands and lower job support. In women, lower job control and higher job demands were significantly associated with poor sleep (Hu, Sekine, Gaina, & Kagamimori, 2007; Hu, Sekine, Gaina, Nasermoaddeli, et al., 2007). A similar gradient was found for oral health (periodontal status) in 15,803 male workers. Thus, professional and office workers had better periodontal status than salespersons, service occupations and drivers (Morita et al., 2007).

Occupational class has been closely linked to occupational stress. By employing effort-reward imbalance and job-demand-control models in a sample of 8029 civil servants, occupational stress was found to differ by occupational class and applied stress models (Kawaharada et al., 2007). Thus, with regard to the job-demand-control model, male managers had a low prevalence of inclusion in the high occupational stress group, male clerical workers the highest risk and production workers a lower risk. Female workers had the highest risk of occupational stress. By employing effort-reward imbalance, male professionals (workers, clerical and protective services) versus managers showed a significantly higher prevalence of being in the high occupational stress group; however, female managers had a higher probability of occupational stress, a different result from that of male managers (Schrijvers & Mackenbach, 1994). Similarly, the relationships between occupational class and exposure to job stressors have been reported by Kawakami et al. (Kawakami et al., 2004) in 19,522 employees. They found significant occupational class gradients in job strain for men and women. However, in comparison to male workers, the occupational class gradients in job strain and job insecurity were greater in women.

In a national representative sample, Fukuda et al. (Fukuda, Nakamura, & Takano, 2007) found that having a higher income and being employed in a large-scale company showed independent associations with higher rates of stomach, colon and lung cancer screening participation. Income-related differences were more pronounced in the middle-aged population than in the elderly and in metropolitan areas versus non-metropolitan areas.

The employment gradient also affects the health of military personnel. Among 974 middle-aged male Self-Defense Forces personnel (Sakuta & Suzuki, 2005), low rank was associated with current cigarette smoking, alcohol abstinence, and poorer vegetable consumption, as well as prevalence of type 2 diabetes and high white blood cell counts. In this study, rank was not associated with

prevalence of obesity, hypertension, hypercholesterolemia, hypertriglyceridemia, or hyperuricemia.

A recent paper investigated the association of socioeconomic differences in health-related behaviors in 20,030 men and 21,076 women aged 25–59 years (Fukuda et al., 2005a, 2005b, 2005c, 2005d). The relationships between health risk behaviors and individual SES, including occupation and household income, were examined by multilevel analysis. The findings showed that men in lower occupational classes, such as “service work”, “transport”, and “labor”, were significantly more likely to engage in risky behaviors compared to those classed as “professional”. There was also a significant gradient of increased chance of risky behaviors according to income, except for excessive alcohol consumption and stress. Also, in women there was a tendency toward current smoking, excessive alcohol consumption and poor dietary habits in “sales workers” and “service workers”, which implies that there is an accumulation of risky behaviors in Japanese women in the lower occupational classes. These results suggest that lower SES is a substantial predictor of risk behavior in both sexes in Japan.

Health inequalities among different occupational classes have been investigated using the data from health check-ups on 589 middle-aged Japanese males (Takashima et al., 1998). After multivariate analysis, adjusted for HT-related factors, the proportion of hypertensives and the mean systolic and diastolic blood pressures were found to be higher for the personnel in “transport and communications”, “clerical”, “managerial and civil” and “professional and technical” categories, whereas these values were consistently lowest in the “service” personnel. BMI was also higher for the four occupational classes with increased blood pressure levels. The authors concluded that the occupation-related changes in BMI might largely contribute to the occupation-related changes in blood pressure.

Occupational differences were observed for leisure-time physical activity in a cross sectional study on 17,637 male and 3017 female full-time employees at nine companies in Japan between 1996 and 1998. In males, monthly leisure-time physical activity was significantly different among occupations, with clerks having greater physical activity than managers and blue-collar workers (Takao, Kawakami, & Ohtsu, 2003). The authors suggested a barrel-shaped distribution of leisure-time physical activity among occupations in Japan as it was highest for the intermediate class. However, the results did not provide such a barrel-shape association in females with different occupations.

In a study of 20,464 male and 3617 female employees, Ishizaki et al. found that a high frequency of sickness absence was associated with increased work stress and a socioeconomically low occupational class (Ishizaki, Kawakami, Honda, Nakagawa, et al., 2006).

Fukuda et al. (Fukuda, Nakamura, & Takano, 2007; Fukuda, Nakamura, Takano, Nakao, & Imai, 2007) undertook a recent ecological study in 47 prefectures and 3366 municipalities across Japan based on seven domains of deprivation (unemployment, overcrowding, low social class and poverty, low education, no home ownership, low income and vulnerable group), which provided an index of deprivation. This index presented different patterns for prefectures and municipalities, but it was significantly correlated with mortality level. The authors highlighted the higher risk of dying among populations in socially disadvantaged areas and encouraged the use of deprivation indices as indicators of socioeconomic conditions.

Japan, as a second economic power, a socially oriented country and unique non-occidental nation with long lasting democratic institutions, but with a specific economic structure and workplace peculiarities, provides a valuable comparative entity in terms of employment and SES. We estimate that the social disparities linked

to occupational class will become more expressed, and urgent protective actions must be implemented.

Income

The relationship between income and well-being was observed a long time ago. For example, in the 1892–1941 period, there was a high correlation between income and stature, regional income inequalities in terms of biological welfare during the 1930s, regional convergence in biological welfare before WWI and a dispersion in regional income level increasing during the 1930s (Bassino, 2006). Currently, we readily observe that the biological disparities have changed into social disparities. All around the world, more income provides better nutrition and housing and access to health care facilities, schooling and recreation.

In comparison with other countries, Japan is still a country of uniformity and stability, even though some perturbations exist and are becoming more and more powerful. Major social, economic, political, cultural and environmental aspects follow these patterns. For example, the Gini coefficient has risen significantly since the mid-1980s from a very low level to one slightly above the OECD average, and the rate of relative poverty in Japan is now one of the highest in the OECD area (www.oecd.org). Population aging is partly responsible for the increasing inequality as it raises the proportion of the labor force in the 50–65-year age group, which is characterized by greater wage variation. Even though the income level still presents characteristics of uniformity, differences are becoming more visible and the gap is increasing. In addition, the unique seniority system of employment is changing rapidly, and the new performance-based system may have an influence on employment grade and income. Economic recession and the desystemization of the labor market during the post-bubble period have resulted in downsizing of the workforce and changes in contract conditions, often not in favor of the employees. Temporary employment has also shown a significant increase in recent years, and this factor has also had a significant impact on SES by decreasing motivation, morale and loyalty (Ferrie, Shipley, Marmot, Stansfeld, et al., 1998). Therefore, Japan may still show different types of associations between SES and health. For example, the social gradient is not applicable everywhere. It has been reported that in Okinawa (which ranks at the top in life expectancy for women and health-related variables, but at the bottom in socioeconomic indicators), health lifestyle is more important than social gradient (Cockerham & Yamori, 2001). However, because all of the new changes with a potential impact on SES have appeared relatively recently, the results could become apparent later.

Low income is a predisposing factor for neoplasms of the uterus and lung (Araki, 1986) and stillbirth (Araki & Murata, 1986). In the same way, low income is the key determinant of decreased life expectancy, except at 65 years of age.

The association between income and health-related QOL has been investigated in three reports. Using a nationally representative sample between 1989 and 1998, Asada et al. (Asada & Ohtsuka, 2004) examined the average health-related QOL and its distribution by income share. They found that between 1989 and 1998, the average health-related QOL in Japan and inequality by income decreased slightly, whereas inequality measured by the Gini coefficient increased slightly. At every income level, women’s health-related QOL was found to be lower than men’s QOL in both 1989 and 1998.

The results of another cross sectional research study on a Japanese sample of 80,899 persons older than 15 years in 1995 demonstrated that in comparison to people whose household income was equal to or more than 5 million yen, those whose household income was less than 1.5 million yen were 1.93 times more likely to perceive their own health as the worst (Shibuya,

Hashimoto, & Yano, 2002). The authors reported that inequality in income at the prefectural level, as measured by the Gini coefficient, was comparable with that in other industrialized countries. They also found that in the multivariate analyses, individual income was more strongly associated with self-rated health than income inequality.

Yamazaki et al. (Yamazaki, Fukuhara, & Suzukamo, 2005) examined the association between annual household income and the eight scale scores of the Medical Outcomes Study Short Form-36 Health Survey (SF-36) as a quantifier of HRQL in a cross sectional survey. A total of 3395 people aged 16 years or older were selected from the entire population of Japan using stratified-random sampling. Results showed that men with lower levels of annual household income had lower scores in all eight SF-36 domains. However, in women, and especially in the subgroup of full-time workers, there were no domains that showed a significant trend.

Fukuda et al. (Fukuda et al., 2004a, 2004b; Fukuda et al., 2005a, 2005b, 2005c, 2005d) investigated the socioeconomic inequality in regional mortality in the 1973–1977 and 1993–1998 periods using Japanese municipal statistics in an ecological study. The municipalities across the country were classified into quintiles according to the index of SES obtained from income and education. Mortality gradient by SES and excess deaths in the lower SES quintiles due to injury and suicide markedly increased from the 1973–1977 to 1993–1998 periods for both males and females. The authors discussed that the prevention of injury and suicide in socioeconomically disadvantaged regions should be given priority. In a related ecological study, the same authors (Fukuda et al., 2005a, 2005b, 2005c, 2005d) found that health expectancy at 65 years was significantly positively correlated with per capita income in municipalities across Japan. The relationship was stronger in larger municipalities (with a population of more than 100,000) than in small- and medium-sized municipalities. The results of this study indicate that the health status of older people is substantially decreased by disadvantageous socioeconomic conditions.

Gender differences in the association of income and health have also been reported in a recent cross sectional study on 9650 participants aged 47–77 years (Wang et al., 2005). A multivariate analysis found that household income had a strong association with self-reported fair or poor health in middle-aged and elderly Japanese. Men tended to report more fair or poor health as household income decreased. In this study too, the results for women differed from those for men.

Income level was associated with smoking in Japanese men and women in a cross sectional survey. Fukuda et al. (Fukuda et al., 2005d) surveyed 20,206 men and 21,093 women in 2001 and found a relationship between lower income and smoking in all age groups in men and women, except in men aged 18–24 years, with the strongest influence in the population aged 25–39 years. However, they argued that the relationship between income and smoking became weaker in an older group aged 40–54 years.

In conclusion, income and SES exhibit a significant relationship in Japan. Occupational gradients, gender differences and area differences are also observed within the Japanese population.

Unemployment

Studies on unemployment can be divided into those in which the exposure is self-reported and those in which it is externally attributed to downsizing or workplace closure. There is consistent evidence that self-perceived and attributed unemployment or job insecurity have significant adverse effects on psychological morbidity, and there is increasing evidence of adverse effects on self-reported physical health, although evidence of effects on physiological measures is weak and inconsistent. Moreover,

unemployment tends to be followed by a period of lower pay and less secure, lower status employment (Ferrie, 2001).

The most frequent consequences of unemployment are economic hardship, financial strain, which leads to an increased stress level, feelings of personal failure, loss of structure in daily routine and social contacts, and finally, a decrease in social status. Since the beginning of the 1990s, as result of economic stagnation and recession, the classic Japanese system of lifetime employment and the worker's loyalty to the company have been compromised and resulted in increases in the unemployment level (Nagata, 2000).

The relationship between unemployment and ill health seems well established. Several studies have reported high mental distress (Weich & Lewis, 1998) and mortality (Jin, Shah, & Svoboda, 1995; Martikainen & Valkonen, 1996) among unemployed individuals in Western countries. However, only a few studies have examined the health effects of unemployment in the Japanese population. An ecological study examined the time trend in the association between municipal SES, including unemployment rate, and all-cause mortality across Japan from 1973 to 1998 (Fukuda et al., 2004b). Sex-specific mortality in 3319 municipalities in 1995 was linked to municipal SES indicators such as income, education, unemployment and living space. The findings showed that a substantial health disadvantage remained in the lower SES areas. However, the impact of SES factors on geographical health variation has changed over time: the association with mortality has weakened for income and education, while it has become stronger for unemployment and living space. Interestingly, employed men are at increased risk of death from cerebrovascular disease compared with self-employed men (Fujino, Iso, et al., 2005; Fujino, Mizoue, et al., 2005; Fujino, Tamakoshi, et al., 2005).

Unemployment presented no association with the risk of suicide death in a prospective cohort study (Fujino, Iso, et al., 2005; Fujino, Mizoue, et al., 2005; Fujino, Tamakoshi, et al., 2005) but was correlated to the method of suicide (Abe et al., 2004). Over 21 years (1981–2001), the gender, age, and suicide methods were investigated for all suicide victims in Japan (5161 cases). The yearly full unemployment rate for the same period was used as a representative socioeconomic factor to investigate the relationship between method of suicide and full unemployment rate. Analyses suggested that there was a significant correlation only for hanging rate, but not for the proportions of other methods of suicide.

The ideal way to investigate predictors and consequences of unemployment would be to conduct a prospective study of a cohort of employed people at baseline with follow-ups over a long period in a subgroup becoming unemployed. One such study examining how employment affects health and lifestyle in the Japanese population was conducted on a group of 768 workers over 40 years of age in a large shoemaking company (Matoba, Ishitake, & Noguchi, 2003). The data from 263 subjects responding to four consecutive surveys every six months were analyzed in detail. Results showed that the subjects kept their health and daily lifestyle in good condition, which might have been due to the financial support of unemployment benefits and the subjects' increased motivation for re-employment. When the right to unemployment benefits expired, mood disorders occurred. With regard to lifestyle factors, the prevalence rates of smoking and drinking consumption barely changed in the subjects, and physical exercise was also habitually undertaken.

Socio-demographic profiles and disease patterns among Tokyo's homeless were investigated in 1938 men who stayed at a welfare institution from 1992 to 1996 (Takano, Nakamura, Takeuchi, & Watanabe, 1999). Not all of the subjects were unemployed, and the principal occupation of the homeless was unskilled daily construction work. Their observed morbidity rates by disease category were greater than those of the general male population in

both Japan and Tokyo. The comorbidity of alcoholic psychosis/alcohol-dependent syndrome with both liver disease and pulmonary tuberculosis were greater than in the general population.

In these studies, the mechanisms of the relationship between unemployment and ill health are not obvious. It is possible that (a) poor health leads to a low status on the labor market and increases the risk of unemployment, (b) job loss and unemployment have adverse effects on health, or (c) both mechanisms are active (Bartley, 1994).

In current debates on the benefits of a flexible labor market for the national economy, the cost of health, social and economic damage to the individual and society must also be taken into account.

Conclusion

Generally speaking, socioeconomic status underlies three major determinants of health: health care, environmental exposure, and health behavior. As noted previously (Berkman & Kawachi, 2000; Marmot & Wilkinson, 2005), the association between socioeconomic status and health might result from a mixture of biological, lifestyle, behavioral, environmental, and social factors rather than from one single cause. In comparison to the rest of the world, and especially highly industrialized countries, in Japan all factors with a prominent influence on SES, like environmental exposure, social environment, health care and behavior/lifestyle, demonstrate a smaller influence on SES because they show better values. The studies that have been introduced here indicate that socioeconomic differences in mortality, morbidity and risk factors are not uniformly small in Japan, but occur to a smaller degree than in the US or Europe. Moreover, the effect of different components of SES on health is expressed at various levels and to different degrees in the regions of Japan, probably due to the different speeds of urbanization (including economic, demographic and health facility components) and differences in lifestyle habits, especially diet and social support. The results also indicate that different socioeconomic contexts and inequality contribute to the mortality, morbidity, biological and behavioral risk factors in Japan, although the pattern and direction of the relationships may not necessarily be of the same degree and intensity as in Western countries. With advancing public health practices and health promotion activities, the dynamic influence of SES on health should be examined using long-term observations, especially with regard to the effects of globalization and recession. Social and political initiatives are therefore needed to amend the inequity between different socioeconomic statuses, which cannot be addressed through intervention at the level of the individual. In addition, educational intervention at an individual level should be emphasized to improve behavioral and lifestyle-related socioeconomic inequality. We suppose that socioeconomic inequalities (including new social risk factors) in Japan will emerge, and the gap previously observed between Japan and other industrialized countries will decrease. However, in comparison with Western societies, where social inequalities will increase at a significantly higher level and speed than in Japan, Japanese social inequalities will be less visibly expressed. Further studies on factors associated with SES in the Japanese context could provide insights into health disparity structures and mechanisms and provide valuable information for health professionals and policy makers.

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