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earthquake-induced damage.<sup>4,5</sup> A disaster can trigger cardiovascular events through sympathetic nervous activation and potentiation of acute risk factors.<sup>6,7</sup> In particular, blood pressure increases during and in the aftermath of a disaster, probably because of sympathetic activation by fear and increased salt sensitivity from insomnia and a disrupted circadian rhythm.<sup>7</sup>

The tsunami-hit areas in Tohoku have some of the most rapidly ageing populations in Japan with a high prevalence of hypertension and diabetes; residents in these areas have little access to high-quality facility-based services.<sup>8</sup> Because of the unprecedented scale of the 2011 disaster (earthquake, tsunami, and nuclear crisis) pre-existing disorders such as hypertension and diabetes might be aggravated in survivors, leading to increased risk of cardiovascular disease.<sup>9,10</sup> Despite such concerns, no rapid or systematic assessment of the health status of survivors had occurred 2 months after the earthquake, partly because of the logistical difficulties involved, but mainly because of the absence of preparedness and coordination between Japanese central and local government, medical communities, and non-governmental organisations and voluntary groups.<sup>8</sup> Uncoordinated small-scale surveys that have been undertaken in affected areas have provoked much controversy and debate about the ethical implications of doing research into populations of survivors.<sup>11</sup>

To better assess and reduce risks for disaster-associated cardiovascular events, we developed the web-based Disaster Cardiovascular Prevention (DCAP) network

on the basis of previous studies,<sup>4-7,12</sup> and have begun to implement it in the survivors of the 2011 disaster. The DCAP system entails calculation of a risk score to identify survivors at high risk of cardiovascular events and promote preventive behaviours. Our initial DCAP assessment aimed at prevention of excess morbidity and mortality in 386 survivors living in shelters in the towns of Minamisanriku, Ishinomaki, and Kesennuma in May, 2011. We used a real-time feedback survey and after completion of a DCAP risk score sheet asked individuals to undertake behavioural components on a score sheet of prevention measures.

We noted that individuals had lowest ratings on the preventive score component for diet, sleep quality, blood pressure control, and bodyweight. Analysis of blood and urine suggested that high salt intake was widespread in survivors, as was hypercoagulability and increased blood glucose concentration. Our survey highlights the potentially urgent need to introduce a system to monitor the health status of survivors in other locations affected by this disaster. We intend to follow up individuals who were assessed and have DCAP scores to assess the validity and reliability of the scores in terms of prediction of cardiovascular events.

In the difficult circumstances after the Great East Japan Earthquake, the DCAP network provided monitoring devices to assess cardiovascular risks in survivors, allowing preventive interventions to be made by participating health facilities and supporting blood pressure control by public health nurses on the basis of DCAP scores. This system can be extended to other health conditions and will aid the integration of traditional facility-based care with multidisciplinary and community-based primary care in the areas affected by tsunamis. A network of health-care provision will also promote empowerment and connectedness in survivors who can otherwise become isolated.

We hope that the DCAP network will be integrated into the community reconstruction plan in Japan in the coming months. Tohoku should not be regarded as an isolated and powerless region but as a pilot for the future Japanese health system, in which innovative technology-driven primary care can connect patients, service providers, and the community and help to integrate health services and research and development. We believe that this unique network will contribute to more effective cardiovascular protection in survivors and

also provide a model for primary care in other settings around the world with restricted access to services and health care.

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# Japan: Universal Health Care at 50 Years 1

## What has made the population of Japan healthy?

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People in Japan have the longest life expectancy at birth in the world. Here, we compile the best available evidence about population health in Japan to investigate what has made the Japanese people healthy in the past 50 years. The Japanese population achieved longevity in a fairly short time through a rapid reduction in mortality rates for communicable diseases from the 1950s to the early 1960s, followed by a large reduction in stroke mortality rates. Japan had moderate mortality rates for non-communicable diseases, with the exception of stroke, in the 1950s. The improvement in population health continued after the mid-1960s through the implementation of primary and secondary preventive community public health measures for adult mortality from non-communicable diseases and an increased use of advanced medical technologies through the universal insurance scheme. Reduction in health inequalities with improved average population health was partly attributable to equal educational opportunities and financial access to care. With the achievement of success during the health transition since World War 2, Japan now needs to tackle major health challenges that are emanating from a rapidly ageing population, causes that are not amenable to health technologies, and the effects of increasing social disparities to sustain the improvement in population health.

### Introduction

Japan has caught the attention of the rest of the world because of the tremendous success it has achieved in improving the health status of its population in the 20th century. The improving health status of the Japanese population was noted as early as the 1920s when infant

mortality rates started to fall.<sup>1</sup> Increased child survival rates were partly possible then through the enhanced education and increasing literacy of mothers—in the early 20th century, with the provision of free compulsory education, almost all girls attended primary schools.<sup>2</sup> However, after World War 2, Japan showed its strength in improving the health of its population. The country was devastated after its defeat. Per person gross domestic product was roughly international \$3400 in 1950 (table), which is similar to that in India today (Gakidou E, Institute for Health Metrics and Evaluation, personal communication). The health status of the population was also poor—in 1947, male life expectancy in Japan at birth was only 50 years and female life expectancy was 54 years.<sup>5</sup>

Rapid economic growth started in the late 1950s and life expectancy started to increase at an unprecedented rate. Within a few decades Japan had caught up with and eventually surpassed many other developed nations (figure 1; figure 2). Since 1986, Japan has ranked first in terms of female life expectancy at birth, with the highest ever recorded worldwide life expectancy of 86 years in 2009.<sup>9</sup> The country had also maintained the best healthy life expectancy at birth in 2007 (73 years for men and 78 years for women).<sup>10</sup> With a low rate of total fertility, the proportion of people aged 65 years and older has quadrupled during the past 60 years to 23% in 2010,<sup>4</sup> making the Japanese people the oldest population in the world. Despite the ageing population, Japan's health expenditure is only 8.5% of gross domestic product, which put it in 20th position in terms of expenditure among the countries of the Organisation for Economic Co-operation and Development in 2008.<sup>6</sup>

What has made the population of Japan healthy? How has Japan achieved the longest life expectancy at birth worldwide? Will the Japanese population continue to be

### Key messages

- The early establishment of free compulsory primary education and a social insurance system before World War 2 and universal health insurance coverage in 1961 enabled the provision of equal opportunities for health promotion.
- Disparities in health across regions and socioeconomic groups are fairly small in this homogeneous and egalitarian society and have narrowed over time with increased average population health. However, the downward trend in socioeconomic inequality in health has been less obvious since the 1990s, which has coincided with income inequality gradually increasing.
- Japanese life expectancy at birth increased rapidly in the 1950s and early 1960s as a result of decreased mortality rates for communicable diseases in children and young adults, which was largely attributable to the government's strong stewardship in investing in key interventions for public health.
- Stroke mortality reduction was one of the major drivers of the sustained extension of Japanese longevity after the mid-1960s. The control of blood pressure improved through population-based interventions such as salt reduction campaigns and an increased use of cost-effective health technologies such as antihypertensive drugs under universal health insurance coverage.
- Further progress in Japan's longevity primarily depends on prevention of major risk factors for non-communicable diseases such as tobacco smoking and high blood pressure and several cardiovascular risks. Prevention of premature mortality from suicide is also a major challenge for population health.
- A rapidly ageing population as a result of improved survival is challenging Japan's health system in terms of its financing and quality of care. An effective link between medical and long-term care through both top-down and bottom-up approaches is necessary to enhance the welfare of the population throughout the country.

	1950	1960	1970	1980	1990	2000	2005	2010
GDP per person (2005 international \$)*	3415	6249	13734	18545	26926	29396	31129	31329
GDP growth rate (%) <sup>‡</sup>	NA	12.0†	4.3	2.8	5.6	2.9	1.9	-5.2‡
Total population (×1000) <sup>‡</sup>	82199	93189	103710	115915	122251	125720	126393	126536
Population older than 65 years (%) <sup>‡</sup>	4.9	5.7	7.0	9.0	11.9	17.2	19.9	22.7
Total fertility rate <sup>‡</sup>	3.0	2.0	2.1	1.8	1.5	1.3	1.3	1.4§
Female life expectancy at birth (years) <sup>‡</sup>	61.5	70.2	74.7	78.8	81.9	84.6	85.5	86.4
Male life expectancy at birth (years) <sup>‡</sup>	58.0	65.3	69.3	73.4	75.9	77.7	78.6	79.6
Total health expenditure (% of GDP) <sup>¶</sup>	NA	3.0	4.5	6.4	5.9	7.7	8.2	8.5¶

GDP=gross domestic product. NA=not available. \*Gakidou E, Institute for Health Metrics and Evaluation, personal communication. †GDP growth rate in 1961. ‡GDP growth rate for 2009. §Total fertility rate of medium-fertility variant estimate for 2010–15. ¶Total health expenditure for 2008.

Table: Socioeconomic and demographic characteristics of people in Japan during 1950–2010

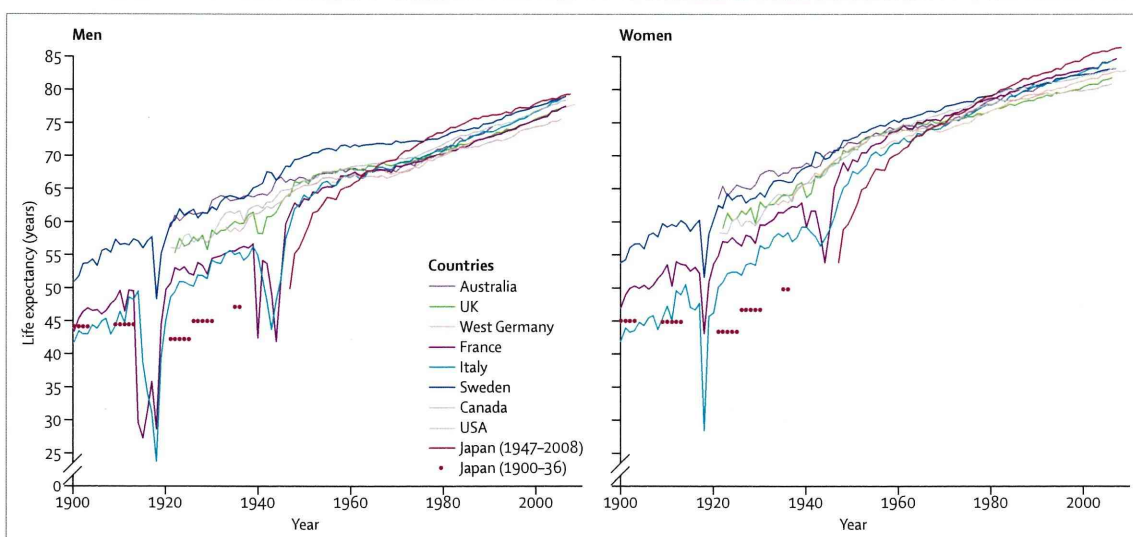


Figure 1: Trends in life expectancy at birth, 1900–2008

Data from University of California at Berkeley and Max Planck Institute for Demographic Research<sup>7</sup> and Ministry of Health, Labour and Welfare.<sup>8</sup>

healthy in the future? Understanding what has contributed to making the Japanese population healthy in such a fairly short period is important for global health policy, particularly for countries struggling to improve health. Several aspects of the Japanese lifestyle provide appealing explanations for the first two questions. First, Japanese people give attention to hygiene in all aspects of their daily life. This attitude might partly be attributable to a complex interaction of culture, education, climate (eg, humidity, temperature), environment (eg, having plenty of water and being a rice-eating nation), and the old Shinto tradition of purifying the body and mind before meeting others.<sup>11,12</sup> Second, they are health conscious. In Japan, regular health check-ups are the norm. Mass screening is provided for everyone at school and work or in the community by local government authorities. A systematic check-up of the whole body, referred to as a human dry dock (panel 1), is another type of health screening, which is popular among business people—they stay at clinics or hospitals for several days to undergo

thorough physical examinations. Third, Japanese food has a balanced nutritional benefit, and the diet of the Japanese population has improved in tandem with economic development over the five past decades.<sup>15,16</sup>

Healthy lifestyle is, however, only one dimension of Japanese life. Japan is now struggling to deal with several major health challenges, which are partly attributable to the striking changes taking place in the demographic and social structures of its rapidly maturing society. The population is projected to shrink from 128 million in 2005 to 95 million in 2050, while the proportion of people aged 65 years or older is expected to rise to 40%.<sup>17</sup> Since the early 1990s, prolonged political stagnation and economic recession have helped induce a feeling of increasing inequality among this ageing population. Moreover, overweight or obesity is an increasingly serious problem, emanating from a shift towards a western-style diet and sedentary lifestyle. About a third of men aged 30–59 years are overweight or obese,<sup>18</sup> although the prevalence of adult obesity (4%) is well below that in other developed nations.<sup>6</sup>

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This is the first in a Series of six papers about Japan's universal health care at 50 years

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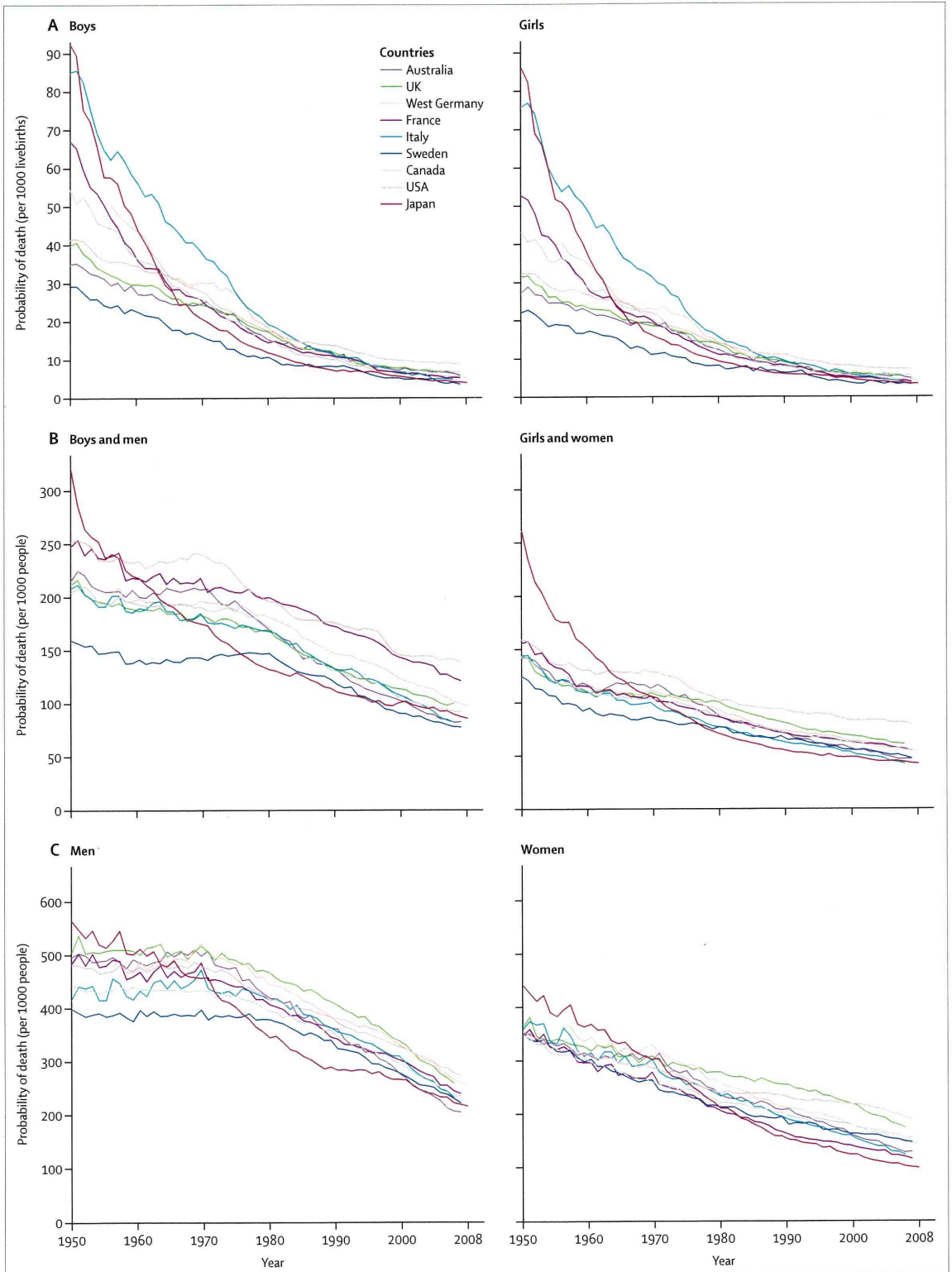


Figure 2: Trends in the probability of death at age younger than 5 years (A), 15–60 years (B), and 60–75 years (C) in Japan and selected countries during 1950–2008  
Data from University of California at Berkeley and Max Planck Institute for Demographic Research.<sup>7</sup>

Furthermore, the working life of typical salaried workers in Japan seems anything but healthy—often working from early in the morning until late in the evening, 6 days a week. To relieve daily stress, some of them resort to negative health behaviours such as smoking tobacco and getting drunk after work, or even suicide in extreme cases. Death from overwork is also a serious social problem. In the context of these demographic and social challenges, what are the best strategies for Japan to protect the health and wellbeing of its ageing population?

In this first report in the *Lancet* Series, we focus on the improvements in the health of the Japanese population after World War 2. We review and analyse the best available data and evidence for population health in Japan to explore what has made the Japanese people healthy (panel 2). We provide an overview of Japan's population health in terms of the rates and distribution of mortality, and assess possible factors that might account for the longevity of the people in Japan. We also draw attention to the future challenges for Japan in controlling risk factors and social determinants to further enhance the health status of its population. We conclude with the global lessons that can be learned from Japan's experience over the past 50 years.

### Mortality rates in infants and young adults

Most of the increase in longevity in Japan in the past 60 years happened during 1950–65. Life expectancy at birth increased by 10.1 years in men and 11.9 years in women during this time, and these increases accounted for almost 40% of the total increase during 1950–2010 (table). Much of the increase in longevity during this early period was indicative of an enormous reduction in mortality rates in children younger than 5 years and young adults. In 1950, the probability of death before the age of 5 years was greater than 80 per 1000 livebirths and was very high compared with the probabilities of death in other developed countries, but fell to about 20 per 1000 livebirths by 1965 (figure 2). The probability of death in individuals aged 15–60 years was also much higher than in other developed countries, but fell and was on a par with probabilities of death in some developed countries by 1965. Consequently, in the 1950s and early 1960s, lower mortality rates in children younger than 5 years accounted for an increase in male life expectancy at birth of 4.1 years and female life expectancy at birth of 4.3 years, whereas reduced mortality rates in adults younger than 60 years accounted for increases in life expectancies of 3.1 years in men and 4.0 years in women (webappendix p 3).

The health of children younger than 5 years improved greatly in 1950–65 through the control of intestinal or respiratory infections and vaccine-preventable diseases that occurred with a drop in the number of neonatal deaths. The age-standardised mortality rate for communicable diseases, other than tuberculosis, decreased by 90% in children younger than 5 years (webappendix p 7); the age-standardised mortality rates for neonatal illnesses fell from 990 per 100 000 boys

#### Panel 1: Human dry dock

The Ningen Dock (or human dry dock) is a comprehensive medical check-up system that is unique to Japan.<sup>13</sup> The Ningen Dock started in 1954 at a hospital in Tokyo. At that time, this service could only be afforded by business and political leaders because it took 6 days of consecutive stay in hospital and cost the equivalent of 3–4 months of a civil servant's starting salary. Advances in automated blood analysers and other testing apparatus reduced the costs, and the 1-day or 1-night stay has become the main type of service. About 3 million people per year are estimated to receive the Ningen Dock at about 1500 medical institutions in the country. A key factor that underpinned the rapid growth in the use of the Ningen Dock was that several companies covered the cost for their employees to ensure their good health.

The Ningen Dock emphasises the importance of a consultation and a post-examination interview. Over 1–2 days, clients undergo a series of medical examinations, such as blood, urine and faecal tests, radiography, and ultrasonography, and a consultation with a doctor about their medical history and lifestyle habits. After the examinations, the doctor explains the results and gives lifestyle advice to the clients.

The Ningen Dock might play a part in the primary prevention of cerebrovascular and cardiovascular diseases through the control of risk factors, such as obesity, hypertension, hyperglycaemia, dyslipidaemia, and hyperuricaemia. It might also be important for secondary prevention through the detection of diseases such as the early stages of cancer. The brain dock with MRI has expanded nationwide since it started in 1988.<sup>14</sup> There has also been a focus on using PET scans to detect the early stages of cancer. However, the cost-effectiveness of the Ningen Dock has been questioned.

to 173 per 100 000 and from 772 per 100 000 girls to 133 per 100 000 during 1953–70 (webappendix p 7). Reduction in mortality rates for infectious diseases, other than tuberculosis, in children younger than 5 years accounted for increases of 2.2 years in male life expectancies at birth and 2.4 years in female life expectancies at birth. The reduction in the mortality rate for neonatal illnesses increased life expectancy by 1.0 year in both sexes (webappendix p 3).

The effect of a reduction in the mortality rate for tuberculosis on the extension of life expectancy at birth in young adults was equivalent to the reduction in mortality rate for other infectious diseases in children younger than 5 years. A 95% reduction in the number of deaths from tuberculosis in adults (aged 15–59 years) in 1950–65 (webappendix p 8) contributed to the increase in life expectancy of 2.4 years in men and 2.3 years in women (webappendix p 3).

These reductions in mortality rates in 1950–65 indicated increasing investment in the public health sector during

See Online for webappendix

**Panel 2: Data sources and methods****Mortality trends**

To assess trends in mortality rates in Japan since 1950, we used life tables and individual cause of death data that were obtained from different sources (Naghavi M, unpublished).<sup>19,20</sup> Life tables were obtained from the human mortality database at the University of California, Berkeley, CA, USA, and the Max Planck Institute for Demographic Research, Rostock, Germany.<sup>7</sup> We also obtained the individual cause-of-death data for 1950–2008 from the Ministry of Health, Labour and Welfare of Japan,<sup>19</sup> and the Institute for Health Metrics and Evaluation at the University of Washington, Seattle, WA, USA (Naghavi M, unpublished).<sup>20</sup> Japan has had a complete vital registration system since 1899. Although the gold standard is cause of death information from vital registration, a potential bias could be attributable to the inclusion of ill-defined codes (eg, cardiac arrest, heart failure, and senility) and unknown causes. With the algorithm developed by Naghavi and colleagues,<sup>21</sup> ill-defined codes and unknown causes on death certificates were redistributed and the consistency across revisions of the International Classification of Diseases and Related Health Problems (ICD) was checked. We assessed the causes that are amenable to medical care, which was originally proposed by Nolte and McKee,<sup>22</sup> extracting the major causes of death from the list (webappendix p 1), because the ICD avoidable causes of death were no longer applicable to our analysis after redistribution of ill-defined and unknown causes.

**Health disparities**

We assessed the trend in regional disparities in longevity with data for municipal life expectancy at birth at 5-year intervals during 1985–2005.<sup>23</sup> Municipalities are the smallest administrative units for which life expectancy data at birth are available in Japan. Sample sizes were 3307–3354 in 1985–2000 and 1963 in 2005. The substantial drop in the sample size in 2005 was due to the municipal mergers that were undertaken after 2000. We assessed temporal trends in socioeconomic disparities in the age-standardised all-cause mortality rate in the working population (aged 30–59 years), using vital records from 1980 to 2005. We used occupational status as a measure of the socioeconomic status of individuals. We standardised death rates per 100 000 at 5-year intervals using the Japanese population in 1985 as a standard population.<sup>24</sup> We obtained population data according to occupational status from tables reported in the national census that is undertaken every 5 years.<sup>27,24</sup>

demilitarisation and democratisation in the early post-war years in Japan. 32 health laws were enacted during the first decade after the war.<sup>25</sup> The Japanese Government collaborated with the American occupation forces in scaling up public health interventions at the community level.<sup>26</sup> Water supply coverage and key interventions for maternal and child health rapidly improved after the war

(webappendix p 10). The effective provision of essential interventions for child survival, such as access to safe drinking water and institutional delivery, was mediated through a high level of maternal education and health facility provision that had already been achieved before the war.<sup>27</sup> Moreover, free treatment for tuberculosis started in 1952,<sup>28</sup> and included systematic screening with chest radiography and the use of streptomycin. The incidence of tuberculosis decreased sharply at a yearly rate of 11% between 1961 and 1977.<sup>29</sup> Additionally, as elaborated in the second report in this *Lancet Series*,<sup>30</sup> health insurance coverage, which was applied to about 70% of the population before World War 2, ensured access to new interventions such as drugs and vaccines for tuberculosis.

**Mortality rates for non-communicable diseases**

Even after communicable diseases had been successfully tackled, life expectancy of Japanese people continued to increase steadily. Male and female life expectancies at birth, respectively, increased by 5.7 years and 5.9 years during 1965–80, 3.0 years and 4.0 years during 1980–95, and 3.3 years and 2.9 years during 1995–2008 (figure 1). The risks of people dying at the ages of 15–60 years and 60–75 years fell, becoming one of the lowest in the developed world by 1980 (figure 2).

In 1950, mortality rates for cancers and ischaemic heart disease were already quite low in Japan compared with those in other developed countries, whereas the stroke mortality rate was very high. The age-standardised mortality rates for men with cancers and other neoplasms, ischaemic heart disease, and stroke were 163.8 per 100 000, 143.4 per 100 000, and 363.1 per 100 000, respectively, and for women 137.8 per 100 000, 124.8 per 100 000, and 326.5 per 100 000, respectively (webappendix pp 11–13). The low mortality rates for cancers and ischaemic heart disease in the early post-war years is one of the features of the health transition in the Japanese people. Although it is not known why the mortality rates for non-communicable diseases, other than stroke, were already low at this time, the reasons might be a favourable lipid profile and glucose metabolism, a generally low body-mass index, and other lifestyle factors relating to diet and low to moderate alcohol intake.<sup>31</sup> Indeed, the results of the Ni-Hon-San study<sup>32,33</sup> and the Honolulu Heart Program<sup>34</sup> showed that Japanese Americans (first-generation immigrants) were more likely to develop ischaemic heart disease and less likely to develop stroke than were Japanese people living in Japan, drawing attention to the importance of lifestyle rather than genetic background in determining the risk of disease.<sup>32–34</sup> The sustained increase in life expectancy at birth after the mid-1960s was largely attributable to reduced mortality rates for non-communicable diseases (webappendix p 4). From 1965 to 1980, reduced mortality rates in adults with these diseases had a substantial effect on increasing life expectancy. Reduction in the mortality rate for stroke in people aged 60–74 years increased male life expectancy at birth by 1.1 years and female life expectancy at birth by

1.0 years (webappendix p 4). Reduced mortality rate for stroke in women aged 75 years and older also accounted for a substantial increase (0.9 years) in female longevity.

The fall in stroke mortality rates slowed during 1980–95, while ischaemic heart disease mortality rates continued to fall steadily. Although not decreasing so rapidly as that of stroke, the mortality rate for ischaemic heart disease in adults aged 60–74 years nevertheless constantly decreased in this period (webappendix p 9). Consequently, although improved stroke mortality rates continued to be a major determinant of increased life expectancy, the effect of decreased mortality rates for ischaemic heart disease became pronounced during 1980–95, particularly in elderly women (webappendix p 5). Moreover, a reduction in the mortality rate in women aged 75 years and older had the largest effect on the increase in female life expectancy at birth, accounting for a change of more than 2 years (webappendix p 5). The distribution of the effects of change in mortality rate on increased longevity by age and cause of death was similar for both sexes during 1995–2008 (webappendix p 6).

An improved stroke mortality rate coincided with a reduction in average blood pressure that started in the late 1960s.<sup>19,35,36</sup> The numbers of deaths from stroke associated with high blood pressure have decreased over the past three decades.<sup>37</sup> Two factors that might be important in contributing to the falling trend in blood pressure in the population are the increased coverage of antihypertensive drugs in patients with hypertension and improved lifestyles that include reduced dietary salt intake.<sup>38</sup>

A population-wide approach with easy access to primary care as a result of universal health coverage has proved to be especially successful in reducing the incidence and prevalence of stroke.<sup>39</sup> The national government launched a strategy for the prevention and control of hypertension and stroke in 1969 and applied the strategy nationwide in 1982. This strategy included the measurement of blood pressure for screening high-risk populations, provision of national health insurance coverage for the clinical treatment of hypertension, and population-wide health education for reduction of dietary salt intake and improvement of other lifestyle-related factors. On the basis of this strategy, occupational health acts were enacted in 1972 and community health acts in 1982 to mandate the provision of programmes for primary and secondary prevention, including annual health check-ups. More than 70% of Japanese men aged 45–54 years have some form of health check-up at least once a year.<sup>40</sup>

A reduction in dietary salt intake has been very important for the health improvement of the Japanese population. Average salt intake among middle-aged men decreased from 30 g/day in the 1950s to 14 g/day in the 1980s.<sup>41</sup> Some aspects of a westernised Japanese diet, such as the improved preservation of food might have contributed to the reduction in dietary sodium consumption.<sup>16</sup> These results partly support the claim that both a population-based approach and subsequent

advances in modern medical technologies with the scale-up of their access have made a substantial contribution to the improved life expectancy of the Japanese population.

### Cultural background

Japan's success in terms of the increased life expectancy of its population is unlikely to have resulted solely from the achievement of good access to health care. Instead, other cultural background factors might be involved. Marmot and Smith<sup>42</sup> hypothesised that the way Japanese people relate to each other and groups might partly account for the longevity of the Japanese population.<sup>42</sup> Results of previous studies have lent support to this hypothesis because strong ties in Japanese communities seem to be associated with improved outcomes in mental health, dental health, and physical functioning, while buffering against the adverse effects of income inequality.<sup>43</sup> More than 50 years of peace and political stability might also have contributed indirectly to Japan's success in population health.

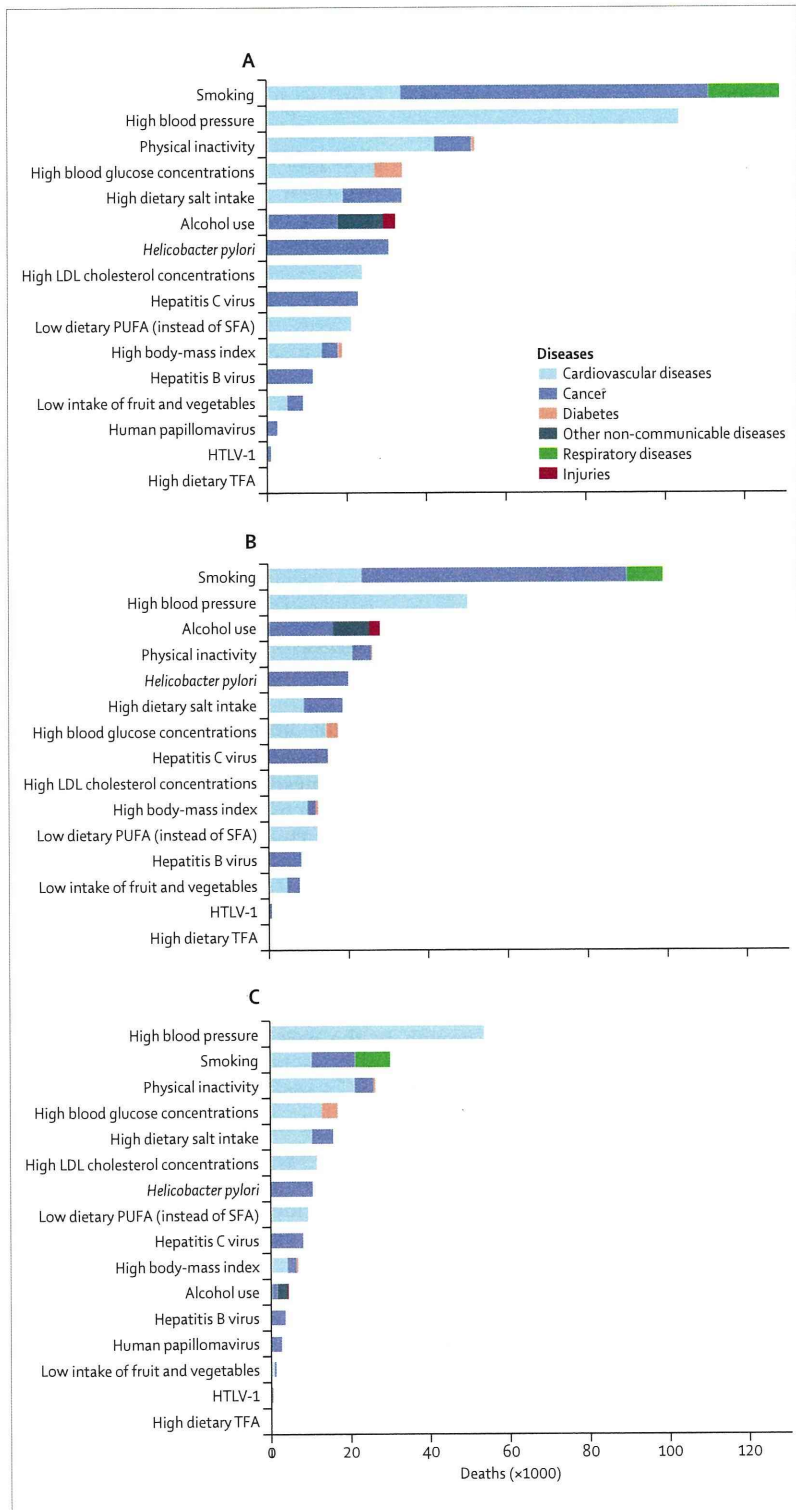
### Health inequality

The homogeneous and egalitarian nature of Japanese society is shown in terms of strong educational policies, formal and informal regulations that ensure employment security, and universal access to health care. Disparities in life expectancy at birth between prefectures had started to decrease before World War 2 and continued to decline steadily until they were very low in the 1970s.<sup>2</sup> Indirect evidence suggests that people living in prefectures in the northeast of Japan might have shorter life expectancies than do those living in the prefectures in the southwest.<sup>44</sup> This geographical gradient might be attributable to differences in risk profiles such as a higher prevalence of hypertension and diabetes in the northeastern prefectures that are related to lifestyles, health-care resources, and socioeconomic status. Our additional analysis showed that the variability in life expectancy at birth across municipalities remained low from 1985 to 2005—standard deviations of longevity changed by about 1.0 for male life expectancy and 0.8 for female life expectancy, and were small compared with 2.0–2.5 and 1.5–2.0, respectively, for counties in the USA.<sup>45</sup>

Gaps in all-cause mortality rates for men in different occupational groups were reduced from the early 1960s to the late 1980s, except for workers in the service industry and those working in the agriculture, fishery, and forestry industries.<sup>2</sup> An additional analysis we undertook showed that the downward trend in socioeconomic disparities in mortality rates continued in the early 1990s, and the mortality rates for managers and professionals rose in the late 1990s, which coincided with the Asian financial crisis in 1997 (webappendix p 14).

The rapid reduction in mortality rates in Japan might have been partly attributable to the narrowing gap in income during the period of high economic growth in the 1960s and 1970s.<sup>42</sup> By the 1990s, more than 90% of





**Figure 3: Deaths from non-communicable diseases and injuries that were attributable to risk factors in Japan in 2007**  
 (A) Both sexes. (B) Men. (C) Women. Data from Shibuya.<sup>37</sup> PUFA=polyunsaturated fatty acids. SFA=saturated fatty acids. HTLV-1=human T-lymphotropic virus type 1. TFA=trans fatty acids.

people believed that they were middle class.<sup>46</sup> However, this belief might no longer be applicable. During the past two decades, Japan has had economic recession. Income inequality has increased to match the average for the member countries of the Organisation for Economic Co-operation and Development,<sup>47</sup> which accords with reports suggesting widening health disparities in recent years,<sup>48</sup> despite the decreasing trend and fairly small health disparities until the 1990s.<sup>2</sup>

### Challenges for Japanese population health Increase life expectancy

Cancer, heart disease, and cerebrovascular disease are the three leading causes of death in Japan, accounting for more than 50% of the risk that a person at age zero will die in the course of their lifetime.<sup>5</sup> To strengthen the extension of Japanese life expectancy, mortality from these non-communicable diseases must be prevented. Although the use of advanced medical technology is a promising strategy for improving survival, modifying the profile of the underlying population risk factors is also important to ensure a long-term increase in population health.

A comparative assessment of preventable risk factors in Japan showed that tobacco smoking and high blood pressure were the two distinctive determinants of adult mortality from non-communicable diseases in 2007 (figure 3).<sup>37</sup> Of 834 000 deaths from non-communicable diseases and injuries, the exposure to tobacco smoking in terms of smoking impact ratios accounted for 129 000 deaths, whereas high blood pressure accounted for 104 000 deaths. A similar estimate of the number of avoidable deaths from tobacco use was reported in a pooled cohort study of the current smoking status.<sup>49</sup> The comparative risk assessment also showed that male life expectancy at birth would have been extended by 1·8 years and female life expectancy at birth by 0·6 years if all adults abstained from smoking; and by 0·9 years for both sexes if the systolic blood pressure was reduced to a pressure that resulted in minimum harmful effects in the population.

Tobacco smoking has a striking effect on population health in Japan. Despite its well known harmful effects, smoking is still commonplace—about 50% of young men smoke—and the rate has been gradually increasing among young women.<sup>18</sup> The Health Promotion Law was enacted in 2003 to support the prevention of smoking and passive smoking in public places. Although compliance with this national tobacco control legislation has improved, disparities still exist in the progress of tobacco control policy across local governments,<sup>50</sup> and no mandatory clean air law has been passed nationally. The retail price of the most popular brand of cigarettes was only US\$3·3 in 2008, much lower than the average price in high-income countries (\$5·0).<sup>51</sup> These circumstances, favouring smokers, show to some extent that tobacco tax was one of the most important sources of revenue for the government in the past.<sup>52</sup> Further, the rate of mortality attributable to

this risk factor has increased in recent decades because of the accumulation of negative health effects in the older population.<sup>37</sup> Without effective policy interventions, the rate of mortality from tobacco smoking will continue to rise in the coming decades. A renewed emphasis on tobacco control, especially through its pricing mechanism, is necessary to discourage the consumption of tobacco products and promote smoking cessation.

Despite the decline in population blood pressure in the past four decades, the management of blood pressure is still not satisfactory in Japan. Blood pressure is effectively controlled with drugs in less than a fifth of the population with hypertension.<sup>37</sup> Additional efforts in the community and clinical practice in terms of early detection, lifestyle modification, and the effective treatment coverage of high blood pressure have the potential to extend life expectancy through a reduction in the mortality rates for cardiovascular diseases. In relation to this, strengthening adherence to standard clinical guideline recommendations<sup>53</sup> in general practice through continued medical education could be the key to increasing the effective coverage of outpatient services and to ensure the compliance of patients, as discussed in the third report in this Series.<sup>54</sup>

A large improvement in population health is still possible through the reduction of several risk factors for non-communicable diseases, such as high concentrations of blood glucose, physical inactivity, alcohol use, overweight and obesity, and high dietary salt intake. The control of several cardiovascular risks could also increase longevity for both sexes by reducing the risk of death.<sup>37</sup> A comprehensive prevention package is needed to lower the combined effects of several risk factors or metabolic syndrome, including the improvement of lifestyles and diet, and to increase the coverage of antihypertensive drugs. This package would be particularly relevant in the current obesity-friendly environment in Japan because, although lifestyle changes generally seem to matter more than do genetic factors, evidence suggests that the Japanese might be genetically more susceptible to being overweight or to developing diabetes mellitus.<sup>55,56</sup> Since 2008, in response to soaring health costs, the government has made it obligatory for people aged 40–74 years to have an annual check-up and a health education intervention that is focused on the prevention of metabolic syndrome,<sup>37</sup> although the effectiveness of health check-ups is not known in Japan.

Japan, similar to other east Asian countries, has many cancer-associated deaths from infectious causes.<sup>58</sup> Infections with hepatitis C virus and *Helicobacter pylori* account for many of the deaths from cancer.<sup>37</sup> In 2007, *H pylori* infection was the cause of 31 000 deaths from gastric cancer. Infection with hepatitis C virus was associated with 23 000 deaths from liver cancer, with clustering in people aged 70–79 years—ie, individuals born in the 1930s. Chronic infection with hepatitis C virus plays a major part in the cause of hepatic

carcinoma in Japan.<sup>59</sup> A decreasing prevalence of infections with hepatitis C virus after the birth cohort of about 1935 suggests that the disease burden of this virus will decrease in the future. The fairly high prevalence of *H pylori* is similar to that of stomach cancer.<sup>58</sup> However, a fall in the prevalence of *H pylori* infection has been noted in people born after 1955,<sup>60</sup> which indicates a future reduction in the burden of gastric carcinoma attributable to this risk factor in Japan.

### Prevention of suicide

Suicide prevention is another challenge for population health in Japan. Suicide rates contribute to premature mortality rates and profoundly affect society—by 2006, an estimated 3 million people had lost a loved one to suicide in Japan.<sup>61</sup> The number of suicides has been greater than 30 000 every year since 1998, when a sharp rise was recorded from the previous year (figure 4).<sup>62</sup> Roughly 70% of people who commit suicide are men and 50% are unemployed, and 40% of suicides in men are in individuals aged 45–64 years.<sup>63</sup> Major motives for suicide among working age men include psychiatric disorders such as depression, business failure, unemployment, and debts.<sup>64</sup>

The trends in suicide mortality rates might be associated with the increasing economic and social insecurity resulting from a stagnating Japanese economy since the beginning of the 1990s, especially in response to the Asian financial crisis in 1997.<sup>65</sup> The unemployment rate in the working age male population rose from 2.0% in 1991 to 3.4% in 1997 and then up to 5.5% in 2003.<sup>66</sup> Additionally, the work environment has greatly changed because of the easing in employment contract regulations in the late 1990s.<sup>67</sup> The employment pattern has shifted from the permanent employment that underpinned high economic growth in the past. The percentage of non-regular workers among male employees has increased from 9% in 1991 to about 19% in the late 2000s.<sup>66</sup> The government has responded to the suicide epidemic with a comprehensive strategy (ie, the Comprehensive Suicide Prevention Initiative<sup>68</sup>) that follows on from the Basic Act for Suicide Prevention, which was enacted in 2006, although its effect is not yet notable.

### Reduction in morbidity and disability

Do Japanese people not only live longer but better in terms of their physical and psychological functioning? Globally, evidence suggests an increasing prevalence of morbidity in accord with the ageing population, while disability has been falling.<sup>69</sup> In Japan, research suggests that trends in disability prevalence differ between the young elderly (65–74 years) and the oldest old (≥85 years). For example, falling disability rates for those aged 65 years and older were recorded during the 1990s in a nationally representative sample of the Japanese elderly

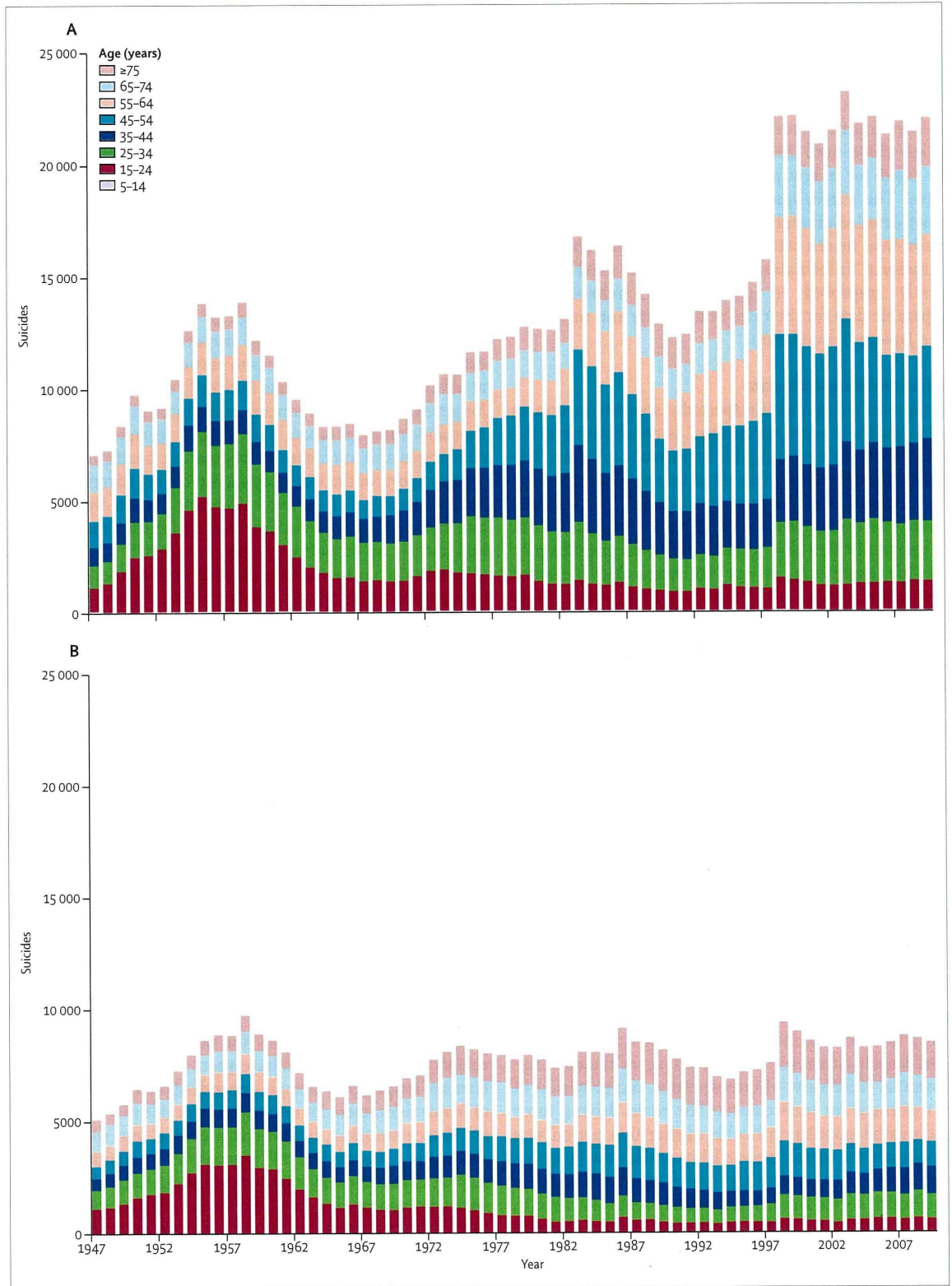


Figure 4: Deaths from suicide by age in Japan, 1947-2009  
 (A) Men. (B) Women. Data from the Ministry of Health, Labour and Welfare.<sup>62</sup>

population,<sup>70</sup> whereas increasing rates were reported for centenarians in other studies.<sup>71,72</sup> National health interview survey data have been used in studies to show that the functional health status of the Japanese people deteriorated during 1995–2004,<sup>73</sup> and morbidity rates decreased from 1984 until 1995, but the trend reversed in the late 1990s until 2004.<sup>74</sup> However, self-reported data were used for a few of the health domains in these studies. The survey questions and response categories are not detailed enough to obtain a reliable measure of the non-fatal health status of the population. Therefore, the national information infrastructure needs to be urgently improved to gather valid, reliable, and comparable data for the rates of disability and morbidity in the Japanese population.

#### Medical and long-term care

An unprecedented and unexpectedly steep reduction in mortality rates in older age groups<sup>75</sup> is contributing to the rapid increase in remaining life expectancy in Japan. The country has shown the most rapid increase in remaining life expectancy over the past six decades. For Japanese women, life expectancy at age 60 years increased from 16·4 years in 1950 to 28·1 years in 2007 (webappendix p 2), while life expectancy at age 80 years also increased substantially from 5·5 years to 11·4 years (webappendix p 2). The stagnating rate of increase in remaining life expectancy in other developed countries during the past two decades draws attention to Japan's exceptional improvement in life expectancy at older ages.

The nature of health care is also changing in this ageing society. The proportion of deaths resulting from illnesses that are no longer amenable to medical care, and Japanese society's concern about health have been increasing. A close link between medical care and long-term care should be further promoted to enhance population wellbeing and will be elaborated further in the fourth report in this Series.<sup>76</sup>

#### Global lessons

The experience of post-war Japan suggests that countries with low socioeconomic development can achieve progress in terms of their population health. Japan's national income was low in the beginning of the 1950s, when a tremendous increase in life expectancy at birth started largely as a result of the scale-up of the coverage of essential child survival interventions and provision of free treatment for tuberculosis. The main driving force for improved population health during this period was undoubtedly the strong stewardship of the new Japanese Government in implementing major structural reforms in the health sector and placing priority on investment in key interventions for public health in the early phase of economic growth.

The path towards universal coverage should be encouraged globally. Stroke mortality reduction was a major determinant of the sustained extension of the

longevity of the Japanese population after the mid-1960s. The control of blood pressure improved with population-based interventions such as salt reduction campaigns and an increased availability of anti-hypertensive drugs through universal health insurance coverage. A reduction in mortality rates can be brought about by the interplay of improvements in both medical care and other societal factors (eg, income, education, nutrition, and sanitation). In turn, this reduction can vary by individual, place, and disease type.<sup>77,78</sup> A recent assessment of worldwide adult mortality rates<sup>79</sup> identified three important factors—socioeconomic development, increased access to health care and the progress in health technologies, and the diseases of affluence. Universal coverage is one of the most important factors and is essential in enhancing access to cost-effective health care at affordable prices that has indirectly contributed to the longevity through reduced cardiovascular-associated mortality rates in Japan. The lessons learned from the challenges and successes of population health in Japan lend support for the implementation of the current global health strategies to develop domestic health financing and risk-pooling mechanisms through health insurance and to scale up cost-effective interventions.<sup>80</sup>

Health disparities across regions and socioeconomic groups are quite small in this egalitarian society and have narrowed over time with increasing average population health. The establishment of free compulsory primary education early in the 20th century, a social insurance system before the war, and universal health insurance coverage in 1961 enabled the provision of equal opportunities for health promotion. These experiences confirm that working on population averages is not enough. Countries that have the least regional or socioeconomic disparity in longevity tend to be those in which the populations enjoy the longest life expectancies in the world.<sup>69</sup> Globalisation and rising economic disparity contribute to health inequalities and are increasingly causes for concern in many countries, and Japan is no exception. The goals of a health system include not only improvement of the averages but also reduction of health inequalities to a minimum.<sup>81</sup> By doing so, countries could accomplish what Japan has achieved.

Japan now has challenges for population health that many other countries will have soon. Further progress in terms of longevity in Japan is dependent on the prevention of major risk factors for non-communicable diseases such as tobacco smoking, high blood pressure, and metabolic syndrome. Prevention of premature mortality from suicide is another major issue requiring a comprehensive societal response that involves, for example, stabilisation of the labour market, and improvement of the promotion and provision of mental health services.<sup>82</sup> The rapidly ageing population as a result of improved survival also challenges financing and quality of care in Japan's health system.<sup>30,54,76</sup> The tsunami and nuclear crisis caused by the



magnitude 9.0 Great East Japan Earthquake on March 11, 2011, might also affect future population health, which will need to be monitored and assessed. How should Japan respond to these challenges? Policy options to tackle the challenges are addressed in the other five reports in this *Lancet* Series on Japan, which we hope will serve as a guide that will help other countries to develop policies that fit their specific circumstances. Indeed, this Series will draw attention to how Japan is unique in overcoming different and changing population health challenges in the past 50 years to achieve population longevity, and how the country's experience can be an important resource for the global health community and could transcend geographical, social, cultural, and political boundaries for understanding and helping enhance population health worldwide.

#### Contributors

All authors contributed to the study concept, design of the report, data analysis, and interpretation of the results. NI, ES, NK, and KS wrote the first draft. MI, HI, and ME did a systematic review. NI, ES, NK, HI, SI, TS, AS, and KS contributed to drafting and critical revision. All authors contributed to the discussion and have seen and approved the final version of the report.

#### Conflicts of interest

We declare that we have no conflicts of interest.

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## Japan: Universal Health Care at 50 Years 2

### Japanese universal health coverage: evolution, achievements, and challenges

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Japan shows the advantages and limitations of pursuing universal health coverage by establishment of employee-based and community-based social health insurance. On the positive side, almost everyone came to be insured in 1961; the enforcement of the same fee schedule for all plans and almost all providers has maintained equity and contained costs; and the co-payment rate has become the same for all, except for elderly people and children. This equity has been achieved by provision of subsidies from general revenues to plans that enrol people with low incomes, and enforcement of cross-subsidisation among the plans to finance the costs of health care for elderly people. On the negative side, the fragmentation of enrolment into 3500 plans has led to a more than a three-times difference in the proportion of income paid as premiums, and the emerging issue of the uninsured population. We advocate consolidation of all plans within prefectures to maintain universal and equitable coverage in view of the ageing society and changes in employment patterns. Countries planning to achieve universal coverage by social health insurance based on employment and residential status should be aware of the limitations of such plans.

#### Introduction

Social health insurance, as a mechanism for progress towards universal health coverage, has both advantages

and disadvantages. The advantage compared with private insurance is that, being based on solidarity, premiums are levied according to the ability to pay, and not on the risk of illness.<sup>1</sup> By comparison with a tax-based system, the advantage is that the benefit package is defined as an entitlement and is financed by contributions that are earmarked for health care.<sup>2</sup> The weakness of social health insurance in which plans are organised according to employment and residential status is that solidarity is limited to people enrolled in the same plan. Consequently, plans that have enrollees with high average income and low risk will oppose any national equalisation because this process would lead to increased contribution rates.

Despite this obstacle, Japan managed to extend social health insurance to the entire population in 1961, and has since made benefits more equitable. These developments have been made in conjunction with regulatory measures for containment of costs through a fee schedule that sets the price and conditions across the board for all such plans. The tightening of these measures has contained costs compared with other countries: Japan is ranked 20th among Organisation for Economic Co-operation and Development (OECD) nations in the proportion of gross domestic product (GDP) spent on health.<sup>3</sup> This success in containment of costs has been a key factor for improvement of the equity of the system among plans and beneficiaries. Details of the cost-containment mechanism and quality control are explained in the third paper in this Series.<sup>4</sup>

But Japan is faced with a difficulty inherent in social health insurance; with an ageing society, the premiums paid by people who are working have become insufficient to cover the costs of health care for everyone.<sup>5</sup> In Japan, this difficulty has been exacerbated by the huge fiscal deficit amounting to twice the GDP<sup>6</sup>—which has restricted the capacity to increase funding from taxes—

#### Key messages

- Japan achieved universal health coverage in 1961, almost 40 years after social health insurance was first legislated in 1922. Coverage was expanded by establishment of employee-based and community-based plans, of which there are now about 3500. Dependants are covered by the plan of the head of the household.
- The services covered and the fees set for physicians and hospitals have been uniform across the nation since 1959, when community-based plans adopted the fee schedule of employee-based plans. Regulation of price has been the key mechanism for maintenance of equity and containment of costs.
- Although almost everyone became insured in 1961, the co-payment rate differed greatly: individuals with employee-based plans paid only a token amount for the first physician visit, but all others had to pay 50% of the fee schedule price. Since then, the rate has gradually decreased for those on community-based plans, and has gradually increased for employees. Nowadays everyone, except for elderly people and children, pays 30%. However, when the monthly co-payment exceeds a threshold amount, the co-payment is decreased to 1%.
- The greatest inequity is in the proportion of income levied as premiums. Although plans insuring people with low incomes are mitigated by subsidies from general revenues, and cross-subsidisation is enforced among plans to pay for the health-care costs of elderly people, there exists more than a three-times difference in the proportion of income paid as premiums across different plans.
- The sustainability of social health insurance is threatened by the increasing disparity in income and age composition among the plans, as a result of the ageing of society and changes in employment patterns. We advocate consolidation of all plans within prefectures to meet this challenge.
- Countries seeking to achieve universal health coverage through social health insurance based on employment and residential status should be aware of the limitations of this approach and address its weaknesses before opposition to structural reform becomes entrenched.

the continued existence of 3500 social health insurance plans, and changes in employment patterns. This report is divided into three parts: the first on historical development; the second on present status and issues in equity; the third on challenges and our plan for reform.

### Historical development

Although some public-sector employees began to have their health care covered as part of comprehensive benefits in Mutual Aid Associations from 1905, the road to universal coverage formally started with the enactment of the Health Insurance Act in 1922. Japan's insurance system followed the German social health insurance model in that the insurance plans (referred to as societies in Japan) were jointly managed by employers and employees.<sup>7</sup> The motives were also the same: improvement of industrial productivity and pre-emption of labour unrest.<sup>8</sup> These nationalistic goals prevailed over opposition from all parties immediately concerned: employers, because insurance increased labour costs (they had to pay half or more of the premiums); employees because they had to pay their share; and physicians because they had to accept lower fees than under the old system. Physicians ultimately went along with the fee schedule, partly persuaded by the argument that patients enrolled in social health insurance would no longer default on payments, and because they could continue to charge higher prices for patients who were not covered than for those with insurance. The fee schedule was straightforward and said to have been designed overnight by Shibasaburo Kitasato, President of the Japan Medical Association. It focused on primary care services and prescription drugs, because dispensing was the main source of revenue for physicians, whereas hospital services had a minor role in 1927.<sup>9</sup>

When first implemented, Japan's social health insurance scheme covered only manual workers, who represented 3% of the population in 1927. However, the scheme included those working in small firms. Small firms were probably included because their employees had been covered by the same worker's compensation system as employees in large firms. Because small firms did not have sufficiently large risk pools or the administrative capacity to manage their own system, the government had to provide health insurance for them directly—the origin of government-managed health insurance. This role of the national government as one, and the largest, among a group of health insurance carriers, rather than as either coordinator of insurance plans or the sole insurer, is the most distinctive element of Japan's health insurance system even nowadays. This role led the government to play a dominant part in negotiating with providers and weakened the independence of the social health insurance plans. However, unlike in countries in which health insurance is tax-based, the government did not take direct responsibility for financing the system.

The other source of Japan's social health insurance system is citizens' health insurance—local programmes

### Search strategy and selection criteria

The first section about historical development is based on a synthesis of domestic and international published work on social health insurance systems, and draws on previous studies made by the lead author. The only available nationally representative surveys are those that have been done by the national government. From the patient survey, we examined the effect of universal coverage on service use by age groups because the changes in co-payment rates would have the greatest effect on elderly people. For the degree of equity, after using PubMed to review the published work, we decided to adopt the method described in the World Bank Institute report to compare Japan with other countries. For data, we obtained access to the most recent individual level data available from the National Survey of Family Income and Expenditure to analyse the degree of progressivity of household expenditures to health-care expenditures, and to compare the extent of catastrophic payment. To compare horizontal equity, we obtained access to individual level data from the Comprehensive Survey of People's Living Conditions to analyse access to services adjusted for health need variables. In the following section on challenges and proposals for reform, reports and policy statements from the government national associations of health insurance plans were reviewed and analysed. We searched resources such as PubMed, Medline, JSTOR, and Google Scholars, and examined government reports and unpublished work from domestic sources. In formulating our proposal for reform, we discussed the possible options after examining the international experiences on consolidating social health insurance plans.

resulting from a voluntary, community-led movement in the 1930s.<sup>10</sup> The national government later formally recognised and supported this movement with the Citizens' Health Insurance Act of 1938. Unlike those enrolled in the employee-based plans, farmers and other self-employed workers did not have a regular source of income, nor was their income easy to assess. Consequently, each plan had its own method of collecting premiums with various degrees of progressivity. In addition to risk pooling, many such programmes established clinics and hospitals for their enrollees. This action led to confrontations with private practitioners, which were usually resolved by negotiation of fees with them and with hospitals.

The subsequent development of Japan's social health insurance can be divided into four periods. In the first two periods, the population covered by such plans expanded, and in the latter two periods, the differences in co-payments between insurance plans gradually decreased. Although not based on any explicit grand design, the system's general direction was towards realising egalitarian access and cost.

In the first period, from 1922 to 1945, the driving force to expand coverage came from the military, who were

This is the second in a Series of six papers about Japan's universal health care at 50 years

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For more on the World Bank Institute Report see <http://www.dcp2.org/file/146/Analyzing%20Health%20Equity%20Using%20Household%20Survey%20Data.pdf>



concerned about the physical condition of draftees, as the war with China intensified in the 1930s, and by extension about women in their childbearing years, Employee-based social health insurance was expanded to all employees in workplaces with more than five full-time equivalent workers in 1934, and to office workers and dependants in 1939. During this time, citizens' health insurance plans were established in many municipalities. As figure 1 shows, the government's efforts to expand coverage succeeded to the extent that, at the peak of the first period in 1943, 70% of the population was insured.<sup>11</sup>

In the second period, after World War 2 (from 1945 to 1961), the major political parties—the Liberal

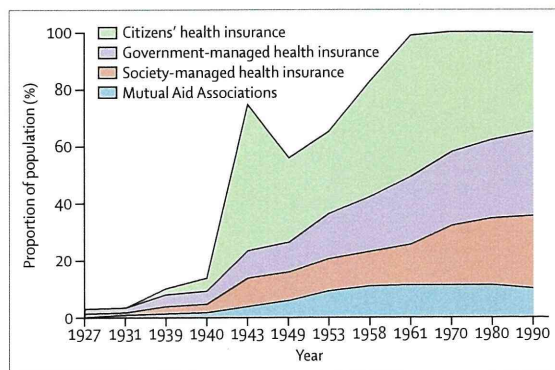


Figure 1: Trends in health insurance coverage in Japan, 1927-90  
Values for years during World War 2 are estimates. Adapted from Takagi.<sup>11</sup>

### Panel 1: Status of social health insurance plans

The main features of Japan's social health insurance system are:

- Individuals have no choice of plans.
- Dependants (except those older than 75 years) are covered by the plan of the head of the household.
- Employers have to enrol their employees (except those working less than three-quarters of the hours that full-time employees work, and those aged 75 years and older).
- All those not covered by employers, including people who have retired, have to enrol either in citizens' health insurance (if younger than 75 years) or in the Late Elders' Health Insurance (if 75 years or older) of their local government, unless they are on public assistance.
- There are about 3500 plans, roughly half employee-based, half community-based.
- In employee-based plans, contributions are deducted as a set percentage of wages, with the employer contributing at least half (55% on average). In community-based plans, each municipality has its own method of setting contributions, which are roughly based half on income (sometimes also assets), and half on a flat amount per enrollee (sometimes also per household), with premiums paid to the municipal government.
- Services covered, including drugs and dentistry, and payments to providers are the same in all plans.
- Despite the generally high co-payment rate, the proportion paid by patients is only 14% of national medical expenditure,<sup>13</sup> because of a reduced rate for elderly people and the provision of catastrophic coverage (data compiled by the Ministry of Health, Labour and Welfare that include all expenditure under public management, but exclude some factors such as over-the-counter drugs, and private room charges that are included in Organisation for Economic Co-operation and Development statistics<sup>14</sup>).

Democratic Party and the Japan Socialist Party—competed over establishment of a welfare state, with health insurance for all as a popular and tangible goal. Insurance coverage quickly recovered from the chaos of war-time and post-war conditions and expanded further.<sup>11</sup> In 1958, a new citizens' health insurance law formally committed Japan to universal coverage by making enrolment mandatory for people not covered by employee-based plans. The law mandated the adoption of the fee schedule of employee-based plans, which laid the basis for those enrolled in citizens' health insurance plans to access almost any provider. In 1961, when the last municipalities established citizens' health insurance, almost everyone became insured. However, the co-payment rate differed greatly: for employees, only a nominal amount had to be paid at the first physician visit, but their dependants and those enrolled in citizens' health insurance had to pay 50% of the fee schedule price for all services and drugs.

In the third period, from 1961 to 1982, the 50% co-payment rate was gradually lowered to 30%; for heads of household with citizens' health insurance in 1963 and their dependants in 1968, and for the dependants of employee-based plans in 1973. Meanwhile, some municipalities started to cover the co-payments for elderly people from general revenues. This movement expanded to entire prefectures, with the progressive Governor of Tokyo taking the lead in 1969. The national government was thus pressured to legislate free (no co-payment) health care for elderly people (those 70 years and older) in 1973. Another major revision in the same year was the introduction of catastrophic coverage in all plans—ie, no more co-payments once the monthly amount exceeds ¥30 000 (US\$83 in 1973). However, 1973 was the year when economic growth in Japan slowed substantially as a result of the so-called oil shock.<sup>12</sup>

Rising health-care costs and decreasing economic growth set the stage for the most recent period, 1982 to the present, when the co-payment rate was increased for individuals who had previously had low rates. As a result, the co-payment rate eventually became the same for most enrollees. Legislation enacted in 1982 led to a small token co-payment for the elderly population in 1983, and the revision of the Health Insurance Act led to the introduction of a 10% co-payment for employees in 1984. Subsequently, the co-payment for employees increased to 20% in 1997 and to 30% in 2003. For elderly people, the flat amount gradually increased and in 2003 became a 10% rate for those with incomes below that of the average worker, and 20% for those above, which was increased to 30% in 2006. The co-payment is now 30% across the board for all, except for people aged 70 years and older with incomes below those of average workers (93% of all elderly people), who pay 10%, and for children younger than 6 years, who pay 20%. Catastrophic coverage has also been curtailed but with a similar regard to equity; the threshold for the monthly co-payment amount is tiered into three levels



according to the enrollee's income, and a 1% co-payment is levied for the amount above the threshold (panel 1).

### Changes in rates of use

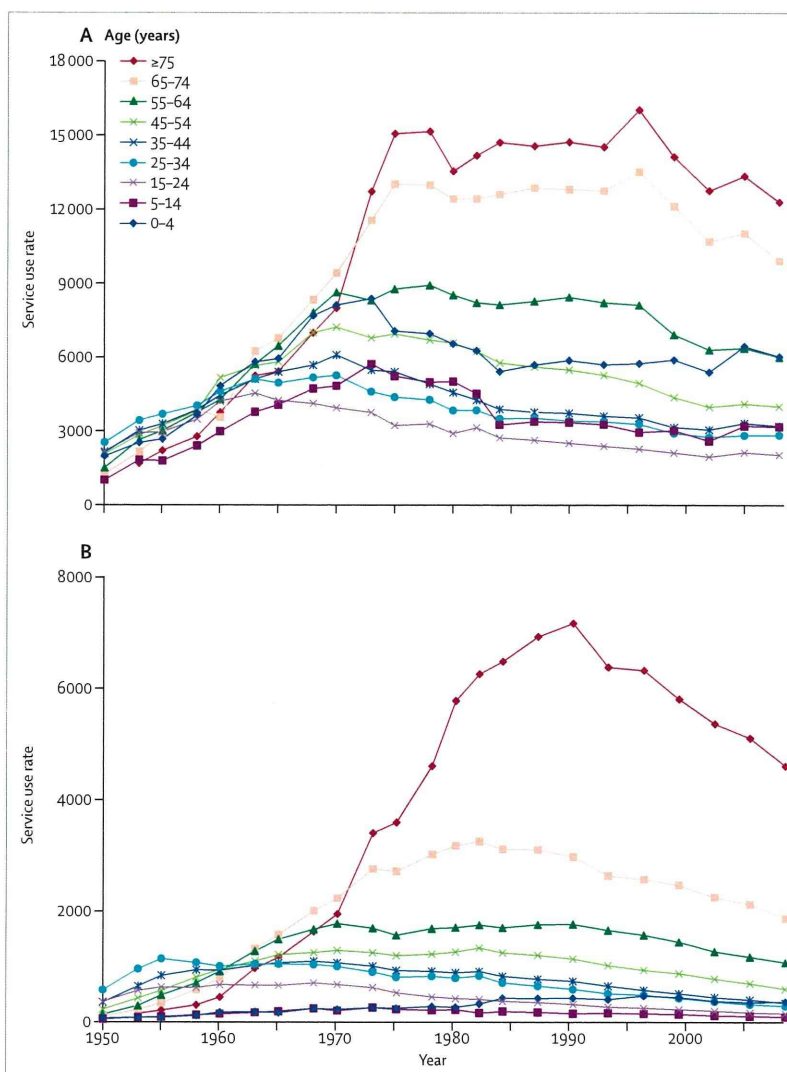
How have the rates of use of outpatient and inpatient services changed over time with the expansion of coverage and adjustments in co-payment rates? As figure 2 shows, the use of outpatient services increased in all age groups from 1950 till the mid 1960s, as the population covered expanded and average incomes increased.<sup>15</sup> From the mid-1960s, the trend began to differ according to age groups. Although it started to plateau for young people and middle-aged adults, it continued to increase for children and elderly people, resulting from decreases in the co-payment rate. Use gradually started to decrease for people younger than 70 years from 1980, and for elderly people from 1999. For employees, the increase in their co-payment rate led to a reduction in use by patients with hypertension and hyperlipidaemia,<sup>16</sup> but for elderly people, no effect has been shown. Other factors, such as the extension of the maximum number of days that drugs could be prescribed from 14 days to 3 months in 2002, could account for decreases in use. Even with the decrease, the per-head number of physician visits was 13.4 in 2007, which was three times that in the USA (4.0).<sup>3</sup> This rate of use shows the "relative readiness with which the Japanese both recognize departures from health and consult doctors about them".<sup>17</sup> Such characteristics might also explain why the number of visits per year is also high in Korea (13.0 in 2008),<sup>3</sup> which has a similar cultural background and historical roots in Chinese medicine.

For inpatient services, the trend is much the same as that for outpatient services, with some differences. First, the rate for the 25–34 year age group was at its highest in the mid-1950s because of the high prevalence of tuberculosis. Second, the rate of increase in people older than 75 years is more striking and so is its subsequent decrease from 1990. The increase was attributable to the provision of free medical care in 1973, which opened the door to so-called social admissions (patients admitted because their families were unable or unwilling to care), and turned many small hospitals into de-facto nursing homes. The subsequent decrease could not be ascribed to increases in co-payment rate because the catastrophic coverage has kept out-of-pocket payments low; it was probably due to the building of new long-term care facilities for elderly people, and other factors.<sup>4,18</sup>

### Complex financing

Subsidies from general revenues and transfers between the plans to equalise the health-care costs of elderly people have allowed the same services to be covered by all social health insurance plans, despite substantial differences in income and age structure. Figure 3 shows this mechanism, which groups the plans into four tiers

according to the average income of their enrollees.<sup>19,20</sup> The first three tiers each cover about 30% of the population, and the fourth covers the remaining 10%. The first tier is composed of 1497 plans that insure people employed in large companies and industry sectors (society-managed health insurance) and 77 plans that insure those employed in the public sector (Mutual Aid Associations). The second tier has only one plan, the quasipublic National Health Insurance Association (reorganised from government-managed health insurance in 2008), for those employed in small-to-medium companies who tend to have lower incomes than those enrolled in the first tier plans. The third tier is composed of citizens' health insurance for the self-employed, the irregularly employed, and pensioners

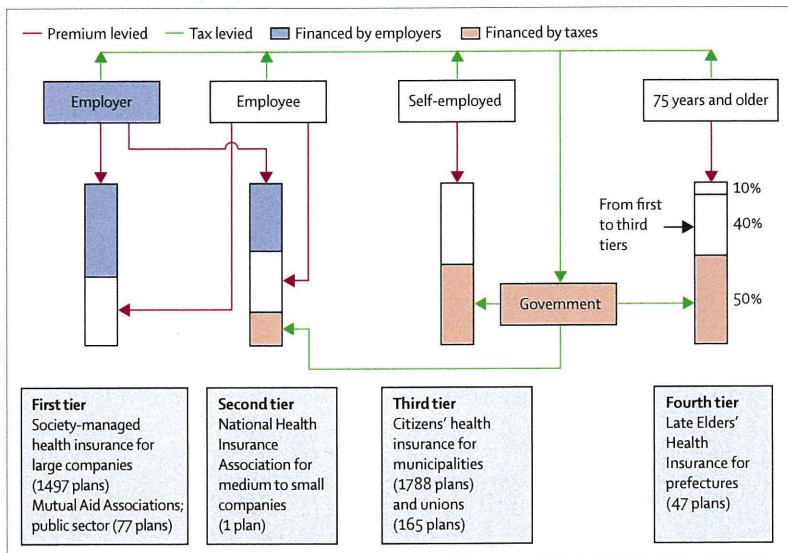


**Figure 2: Trends in outpatient (A) and inpatient (B) service usage rate over time by age**  
Service use rate is the number of people using the services on the day of the survey per 100 000 population in each age group. Since 1984, the patient survey has been done every 3 years, most recently in 2008. Data are from Ministry of Health, Labour and Welfare.<sup>15</sup>



younger than 75 years, managed by the 1788 municipalities, plus the 165 citizens' health insurance unions of self-employed occupational groups (including private

See Online for webappendix



**Figure 3: Financial flow in the four tiers of insurance plans**  
Number of social health insurance plans in Japan as of March, 2009. Data from Ministry of Health, Labour and Welfare.<sup>19</sup>

### Panel 2: Unpleasant surprise for Mr Yamamoto on retirement

Until Mr Yamamoto retired at the age of 67 years from the Japan Industry Corporation, he had not thought about his health insurance contribution. It was automatically deducted from his payroll, along with taxes and other social security contributions. The deductions had increased as his salary had increased, and that was annoying, but he had never looked at the breakdown.

The day after his retirement, he went to his city government's citizens' health insurance division and applied for enrolment. He was surprised to learn that his contributions would be calculated on the basis of his previous year's household income, which would include not only his salary, but also his pension and his wife's earnings of ¥1 million (US\$12 000) as a part-time worker. Additionally, the property tax he had been paying for his house would also be included.

On the basis of his past year's household income of ¥5 million (\$60 000) and his property tax, he was told that his annual citizens' health insurance contribution would be ¥450 000 (\$5400). This amount was more than three times what he had paid to the society-managed health insurance of Japan Industry Corporation in the previous year because his employer had been contributing half; his contributions had been based only on his salary, and excluded both his pension and his wife's earnings; he did not have to pay extra premiums for his wife because her earnings were low enough to qualify her as his dependant; his property had not been included in the calculation; and the city's citizens' health insurance rate was high because it has a large housing complex for people on low income.

However, when Mr Yamamoto visited his local clinic for his hypertension with his new insurance card, both the treatment and the co-payment amount (about \$20 including drugs) were the same as they had been when he was covered under his employer's health insurance plan. He was thankful that nothing had changed about his care after being forced to change his plan on retirement.

Note that case studies are fictional and for illustrative purposes only.

practice physicians, barbers, and construction workers), which enrol about a tenth of those in this tier. The fourth tier is the Late Elders' Health Insurance, established in 2008 as a health insurance scheme to which all people aged 75 and older have to enrol, irrespective of their employment or dependence status; this scheme is managed by one coalition of municipalities in each of the 47 prefectures.

To augment premiums from employers and individuals, the national government provides subsidies from general revenues to the plans in the second to fourth tiers, amounting to a quarter of total health expenditure. Specifically, these subsidies cover 16.4% of benefit spending in the second tier; an average of 50% (40% for rich municipalities, up to 80% for poor municipalities) in the third-tier citizens' health insurance; and 50% in the fourth-tier plan for people aged 75 years and older. Additionally, to equalise health-care expenditure for elderly people, each plan must contribute a fixed amount per enrollee. These transfers, which flow through a central pooling fund, cover 40% of spending in Late Elders' Health Insurance, and subsidise people aged 65–74 years who are enrolled in other plans.

### Extent of equity

The mechanisms discussed here have contributed to making the household's total financial contribution to health care—ie, direct and indirect taxes appropriated to health care, social health insurance premiums, and out-of-pocket expenditures—almost proportional to its income as measured by the Kakwani index,<sup>21</sup> and to be much the same as for schemes in South Korea and somewhat more equitable than those in Germany.<sup>22,23</sup> The percentage of households in which out-of-pocket health-care expenditure exceeded 25% of total expenditure excluding food (the catastrophic threshold) was 1.68% in 2004, which was the similar to that in Taiwan (1.49% in 2000), higher than that in Malaysia (0.78% in 1998–99), but lower than that in South Korea (4.82% in 2000) and China (11.23% in 2000).<sup>24</sup> We analysed whether individuals with the same need get equal access to health care by calculating the concentration index.<sup>25,26</sup> Although the data are difficult to compare, it seems that access to physicians controlled for patients' need seems to be about the same as in the UK (see webappendix pp 1–3 for technical notes on the analysis).

However, when contribution rates are compared across social health insurance plans, the average rate for the citizens' health insurance plans is three times that in society-managed health insurance plans for employees of large companies.<sup>27</sup> Thus, when employees retire and join the citizens' plans, they have to pay higher premiums than they did previously (panel 2). Moreover, even within the first tier, more than a three-times difference exists in contribution rates between



	Minimum	Maximum	Median	IQR	Mean	SD
Number enrolled	26	584 681	7585	14 015	20184.7	44 147.1
Age of employee (years)	25.8	54.1	41.6	3.6	41.3	3.3
Monthly wage (¥)	210 463.0	1 030 349.0	368 333.0	84 839.5	379 381.6	81 462.7
Health-care cost per person insured (¥)	21 113.0	271 336.2	152 946.2	35 812.2	151 222.9	29 535.3
Supplementary benefits per person insured (¥)*	0	37 973	4842.5	6732.8	5179.9	4614.7
Contribution rate as percentage of monthly wage (%)	3.12%	9.62%	7.40%	1.50%	7.31%	1.04%

\*Supplementary benefits that reduce the co-payment amount are available in 86.5% of society-managed health insurance plans. Data are from Federation of Health Insurance Societies.<sup>28</sup>

**Table: Differences between the society-managed health insurance plans**

society-managed health insurance plans, from 3.12% to 9.62% (table).<sup>28</sup> Analysis of contribution rates for these plans shows that they are mainly related to employees' average age and average income, more than to their average health spending. Incidentally, age is a factor because per-head health spending increases gradually with age (figure 4),<sup>28,29</sup> but transfers only equalise spending for individuals from age 65 years.

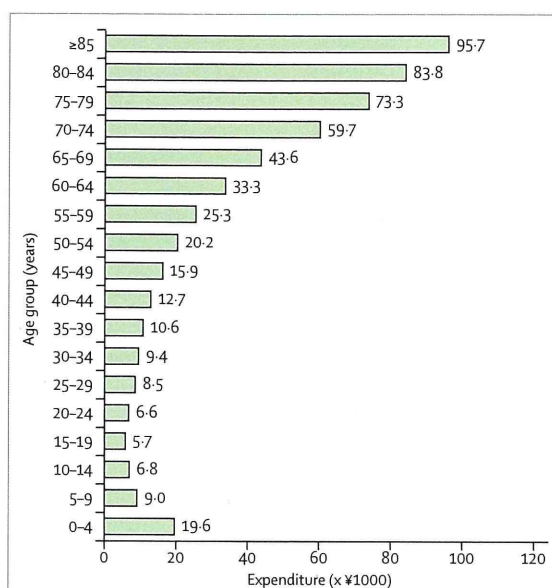
## Challenges and proposals for reform

### Sustainability of the social health insurance system

Opinion polls show that the government's policies to ensure access to health care based on need, rather than on ability to pay, have wide popular support.<sup>31</sup> However, the social health insurance system that has been the basis for achieving this principle is threatened by three factors: the ageing society, changes in employment patterns, and the emerging issue of the uninsured.

First, ageing has led to transfer payments that now amount to nearly half of total expenditure in society-managed health insurance plans for people employed by large companies. These transfers are not only to Late Elders' Health Insurance, but also to compensate for differences in the proportion of individuals aged 65–74 years in other plans (they average only 4% in the employee-based society-managed plans, but 33% in the citizens' health insurance plans).<sup>27</sup> These transfers will increase. Because the proportion of people aged 65 years and older in the population will increase from 22% in 2008 to 30% in 2020, their share of health expenditure is projected to increase from 52% to 66%.<sup>32</sup> Employers and labour unions have protested that these transfers have jeopardised the existence of society-managed health insurance.

The second factor eroding Japan's social health insurance is change in working patterns and the structure of the economy. When universal coverage was achieved in 1961, 29% of all workers were engaged in the primary industries of farming, fishing, and forestry; they formed the backbone of citizens' health insurance. More recently, competitive cost pressures, deregulation, and a shift in corporate priorities to favour shareholders and management over employee welfare have led to hiring of more irregular workers (temporary, part-time, and contracted



**Figure 4: Per-head annual health expenditures by age group in Japan, 2007**  
Data from Ministry of Health, Labour and Welfare.<sup>29</sup>

out)<sup>33</sup> from 18% of the total employed in 1988 to 34% in 2010.<sup>34,35</sup> Anyone who works less than three-quarters of the hours that full-time employees work need not be enrolled in employee-based plans. As a result of these changes, the composition of people enrolled in citizens' health insurance has been transformed. In 1965, the proportion working in primary industry was 42%, and 25% were self-employed. These percentages have decreased to 3% and 17%, respectively, in 2008. During this time, the proportion of pensioners and others not working has increased from 7% to 40%, while that of those who are employed, but not covered by the employee-based plans, has increased from 25% to 34%.<sup>27</sup>

The third factor is the increasing numbers of individuals who are unwilling or unable to enrol in citizens' health insurance, although they are legally required to do so. Municipal governments have no way of knowing who should apply so the numbers cannot be worked out directly. Our analysis of the Comprehensive Survey of People's Living Conditions data for 2007 showed that