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\* Indicates the major publication for the study

## WHAT'S NEW

Last assessed as up-to-date: 21 September 2011.

Date	Event	Description
5 October 2011	New citation required and major changes	New author team, and complete revision of protocol.

## HISTORY

Protocol first published: Issue 4, 2001

Date	Event	Description
6 January 2011	Amended	"Clean slate" for new author team
12 November 2008	Amended	Converted to RevMan 5 and re-published without new citation.

## CONTRIBUTIONS OF AUTHORS

HN, EO and WW designed, set up, and drafted the protocol. RT, SE, AK and KS commented upon and revised the article. All authors have approved the final protocol.

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We declare that we have no conflict of interest.

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- Ministry of Health, Labour and Welfare of Japan, Japan.

## Japan: Universal Health Care at 50 Years 6



# Future of Japan's system of good health at low cost with equity: beyond universal coverage

Kenji Shibuya, Hideki Hashimoto, Naoki Ikegami, Akihiro Nishi, Tetsuya Tanimoto, Hiroaki Miyata, Keizo Takemi, Michael R Reich

Japan's premier health accomplishment in the past 50 years has been the achievement of good population health at low cost and increased equity between different population groups. The development of Japan's policies for universal coverage are similar to the policy debates that many countries are having in their own contexts. The financial sustainability of Japan's universal coverage is under threat from demographic, economic, and political factors. Furthermore, a series of crises—both natural and nuclear—after the magnitude 9·0 Great East Japan Earthquake on March 11, 2011, has shaken up the entire Japanese social system that was developed and built after World War 2, and shown existing structural problems in the Japanese health system. Here, we propose four major reforms to assure the sustainability and equity of Japan's health accomplishments in the past 50 years—implement a human-security value-based reform; redefine the role of the central and local governments; improve the quality of health care; and commit to global health. Now is the time for rebirth of Japan and its health system.

### Introduction

The global health community is quickening its efforts aimed at ensuring health coverage for all.<sup>1-3</sup> The 58th session of the World Health Assembly in 2005 endorsed a resolution, urging its member countries to work towards sustainable health financing, defining universal health coverage as access for all to appropriate health services at an affordable cost. The World Health Assembly also urged countries to strive for the achievement of universal coverage by using, in accord with their specific contexts, a mix of prepayment systems that include tax-based financing and social health insurance.<sup>4</sup> In the past decade, low-income countries such as Ghana and Rwanda have introduced national health insurance schemes designed to achieve universal coverage at an affordable cost.<sup>5-7</sup>

The definition of universal coverage is still debated, but generally it is access to key promotive, preventive, curative,

and rehabilitative health interventions for all at an affordable cost. The principle of financial risk protection ensures that the cost of care does not put people at risk of financial catastrophe.<sup>4,8,9</sup> The social health insurance approach allows the gradual expansion of the population covered and solidarity among the individuals enrolled in each plan.<sup>9</sup> Japan achieved universal health insurance coverage in 1961 when virtually the entire population became covered by plans for social health insurance.<sup>10</sup>

Achievement of universal coverage is, however, not an end, but the beginning of new challenges. Universal

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

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### Key messages

- Although Japan achieved universal coverage in 1961 and other health-care policies and programmes have led to excellent population health at low cost with equity, the nation now has many challenges.
- Three common challenges to the health system of Japan—economic sustainability, political governance, and responsiveness to patients—were identified in the other reports in this *Lancet* Series.
- The Great East Japan Earthquake in March, 2011, showed the underlying structural problems in the health system but made the three challenges much more difficult to resolve fiscally.
- To address these challenges, we propose four major reforms for Japan's health-care system: implement human-security value-based reform; redefine the role of the central and local governments; improve the quality of health care; and commit to global health.
- There are promising signs that Japan will be able to achieve both structural health reform and disaster reconstruction. This domestic experience could be the basis for Japan to take an increased proactive role in promoting global health.

### Search strategy and selection criteria

We searched PubMed, Medline, Embase, Jamas, and Jstor databases, government reports, and unpublished literature from domestic sources. Once a source was identified, it was used to generate additional material (eg, by searching the reference lists of reports obtained while using this search strategy). The first section of this work is based on the earlier reports in this *Lancet* Series in which health and its associated factors are assessed in Japan 50 years after the introduction of universal health care coverage in the country. To discuss the effects of the Great East Japan Earthquake and the accident at the Fukushima nuclear power plant that followed, we used reports identified and retrieved using the above-mentioned method and documents issued by the International Atomic Energy Agency, Japanese Government, and other sources including those produced by the domestic media.

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coverage has never been static in Japan and has been developing since 1961, including changes in copayments, how financing is subsidised with taxes, and cross-subsidies for different plans.<sup>10</sup> This gradual change in Japan's policies for universal coverage shows policy debates that are underway in many countries in their own contexts. The financial sustainability of Japan's universal coverage is under threat from demographic, economic, and political factors.

However, the situation of low economic growth rate and unstable political climate creates a particularly difficult situation for addressing the problems of universal coverage and undertaking structural reform. Furthermore, a series of crises—both natural and nuclear—after the magnitude 9.0 Great East Japan Earthquake on March 11, 2011, has shaken up the entire Japanese social system that was developed and built after World War 2 (panel 1).<sup>11</sup> The disasters have clearly shown underlying structural problems in the Japanese health system that have existed for a long time.

#### Panel 1: The Great East Japan Earthquake

On March 11, 2011, a magnitude 9.0 earthquake and tsunami occurred at about 130 km off the northeast coast of Japan's main island of Honshu, setting off a cascade of crises that included a major nuclear power plant disaster.<sup>12</sup> The combined earthquake–tsunami disasters killed more than 15 500 people, with about 7000 still missing in early July, injured more than 5300, and also severely damaged more than 217 000 houses.<sup>13</sup> The earthquake–tsunami–nuclear power plant disasters created more than 100 000 evacuees.<sup>11,13</sup> Drowning from the tsunami was the primary cause of death in more than 90% of cases.<sup>13</sup> The triple disasters resulted in Japan's greatest humanitarian crisis since the end of World War 2.<sup>11,14,15</sup> In the acute phase of the disasters, emergency care was provided by many Japanese-based health institution teams, Japan's Self-Defence Force, and a few international medical teams; these efforts contributed to saving lives and treating diseases in the affected areas. Assessments are now being done on ways that emergency relief could have been improved in the acute phase.

Japan's triple disasters have now entered the chronic phase of relief, raising many difficult health questions about the processes of reconstruction. First, the management of chronic illnesses (eg, hypertension and diabetes) remains a critical health priority for both evacuees and non-evacuees. These problems have been aggravated by the lack of exercise and high salt intake among evacuees in shelters. Second, mental health problems (including post-traumatic stress disorder and hyperventilation) have emerged widely among the people affected, their family members, and the health and aid workers.<sup>16</sup> These problems are related to the massive devastation and losses at the individual and social levels, and the high levels of uncertainty about the future, including radiation-related health risks, financial compensation, and community reconstruction. Third, the local economy has been destroyed throughout the region; many companies face disaster-related bankruptcy; power shortages have undermined production, and tax increases are likely to be introduced to fund the huge construction needed. Thus, the disasters have had many effects on people not directly affected. Last, the chronic phase includes the monitoring of radiation exposure and potential health effects at the population level, for workers at the power plant, nearby residents still in their houses, and evacuees in the radiation-contaminated zones. Public concern remains very high about radiation exposure from the catastrophes at the Fukushima power plant and the inability of the government and Tokyo Electric Power Company to control the nuclear disaster and provide credible public information about what is happening.

In Japanese, the term crisis literally consists of two Chinese characters—risks and opportunities. We started *The Lancet* Series about Japan<sup>17</sup> with the belief that Japan's current political, economic, and social circumstances offer opportunities for bipartisan reform of the health-care system after five decades of universal coverage, and the hope that Japan's definition of human security can provide the key values for dealing with both domestic and global conundrums in health policy.<sup>10,18,19</sup> The reports in this Series provide a comprehensive analysis of the major topics of health in Japan—population health, universal coverage, costs and service quality, ageing and long-term care, and global health.<sup>10,17–20</sup> Here, we summarise the main achievements of Japan's health system, discuss the challenges it confronts for the future, and present our recommendations for reform.

#### Good health at low cost with equity

Japan's premier health accomplishment in the past 50 years is the achievement of good population health at low cost with increased equity between different population groups. A landmark study<sup>8</sup> of health systems (in China, Costa Rica, Sri Lanka, and the Indian state of Kerala) reported in 1985 is now being revisited by an alliance of international researchers.<sup>21</sup> We believe that Japan's experiences, especially how the country successfully pursued egalitarian principles while seeking good health at low cost, provide several important lessons for the achievement of good population health.

Japan's achievement of universal health insurance coverage in 1961 was fairly early in the world, especially with an income per person that was half that per person in the UK.<sup>10</sup> Today virtually all Japanese people are covered by social health insurance, through 3500 plans according to where they are employed or where they reside. Japan has also reduced inequities between the different insurance plans by making co-payment rates uniform, except for elderly people and children, and by mandating cross-subsidies among plans to adjust for the different proportions of elderly people enrolled. These efforts have worked towards implementation of egalitarian principles of equal treatment in terms of social health insurance for nearly all Japanese citizens. However, inequities exist in the proportion of income contributed as premium and part-time workers are increasingly not insured.<sup>10,22</sup>

A concern about universal coverage is how to control health expenditures in a sustainable manner.<sup>23</sup> Japan's basic policy has been a combination of tight supply-side control for the conditions of payment with the fee schedule, with a laissez-faire approach to how services are delivered.<sup>17</sup> Although the structural and process dimensions of quality, especially in chronic disorders such as hypertension, seem to be poor, quality is primarily a result of how physicians and hospitals have developed, and the inadequate governance of professional organisations, and not attributable to the cost containment

policy. Outcomes of subspecialty acute care services such as postsurgical mortality rates are as good as those reported in other countries. However, the needs and supply of health-care resources are mismatched, and accountability is lacking for the quality of care.

Japan has also developed innovative policies to address the country's rapidly ageing population. The proportion of people aged 65 years and over has nearly doubled in the past two decades, going from 12% in 1990 to 23% in 2010. Since the late 1970s, policy makers in Japan have focused on how to finance health expenditures for elderly people. As discussed in the report about ageing in this Series,<sup>20</sup> Japan implemented a public long-term care insurance in 2000 to meet the challenges of its ageing society and to contain health expenditures. Long-term care insurance operates on the basis of social insurance principles, with benefits provided irrespective of income or family situation; it is unusually generous in terms of both coverage and benefit. This policy has gained widespread public acceptance, shown in the doubling of service use and expenditures in the past 10 years, during which health expenditures increased by only 15%. Although the policy's effects on beneficiaries and carers still need a complete assessment, the long-term care insurance policy has been successful in enhancing women's participation in the labour market and reducing the fiscal burden on households. However, issues of financial sustainability, overdependence on institutional care, and inadequate attention to the needs of informal carers remain to be solved.<sup>20</sup>

Japan's health achievements for the population are impressive. Life expectancy at birth for women is 86 years and has ranked first in the world since 1986. The achievement in reduction of mortality rates can be considered in two periods, as discussed in the report about population health in this Series.<sup>19</sup> The first period was right after World War 2 until the mid-1960s when reductions were noted in mortality rates in children younger than 5 years with infectious diseases and in adults with tuberculosis. The second period was from the 1960s until now (after achievement of universal coverage), when reductions in rates were mainly noted for adults and elderly people with cerebrovascular and ischaemic heart diseases.

Reductions in mortality rates were partly attributable to public health measures for infectious diseases and the provision of free treatment for tuberculosis in the first period even when the country was poor, and to management of health risks through salt reduction and the use of antihypertensive drugs in the second period. The health-care system made a synergistic contribution by assuring access to health care for all citizens, and by regulating prices so that out-of-pocket payments by patients were low. Japan's experience of good health at low cost suggests that a country's priority in health policy should initially be on improving access and preventing impoverishment from health care, and then efficiency

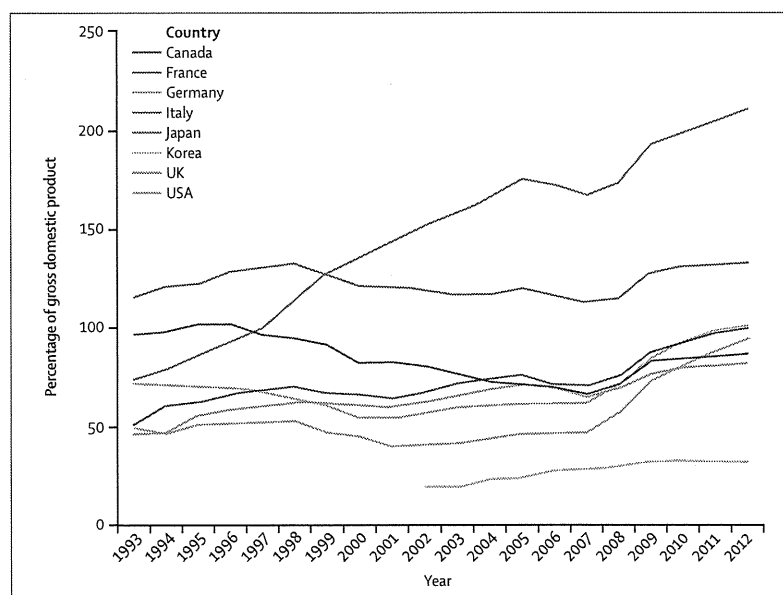


Figure 1: Government debts as proportion of gross domestic product  
Data from the Organisation for Economic Co-operation and Development.<sup>17</sup>

and quality of services should be pursued.<sup>17</sup> Even in the 1950s, mortality from causes other than infectious diseases and cerebrovascular diseases was already low, suggesting that the Japanese have a genetic or lifestyle-related propensity to longevity.

In the past two decades, life expectancies have continued to improve despite adverse economic circumstances, increases in copayment rates for many people since 1983, and increases in income disparity and unemployment rates since the 1990s. However, doubts exist about whether Japan has really achieved a healthy society. Available data show that the improvement in healthy life expectancy decelerated since the 1990s.<sup>24</sup> Additionally, although Japan's socioeconomic disparities in various health outcomes are still small compared with other countries, mortality rate is increasingly determined by the socioeconomic status and suicide rates are increasing among male workers.<sup>19</sup> These health problems might be indicative of broader systemic challenges that require solutions, especially in the context of Japan's persistent economic stagnation and increasing government debt besides its rapidly ageing population.<sup>25</sup> Can Japan manage to pursue the health of the population and the health of each individual at a low cost?

### Japan's future challenges

The three major challenges to the Japanese system for good health at low cost with equity have been identified as economic sustainability, political governance, and consumer responsiveness in this Series.<sup>10,17-20</sup>

First, the most daunting challenge for Japan is the national fiscal situation and the way health care is financed. Although the bulk of health expenditures is

**Panel 2: Drug and device lags**

In Japan, there are substantial delays in the approval and introduction of new health technologies, including drugs, devices, and vaccines. New drugs took about 3.7 years after first world application before market launch in Japan during 1999–2003.<sup>33</sup> This long period compared with delays in other developed countries is attributable to the longer processes required for undertaking clinical trials, delay in filing new drug applications in Japan, longer approval process by Japan's regulatory authority, and tight price regulation that dampens incentives for pharmaceutical companies to enter the market.<sup>34,35</sup>

The delay is even longer for new devices in Japan. For example, Japan's approved implantable artificial heart has been replaced with newer second-generation devices in other countries. As a result, the device used in Japan has disappeared from the global market, and the latest devices are not available to Japanese patients with end-stage heart failure.<sup>36</sup>

Similar delays have been noted for vaccines. In Japan, vaccines for *Haemophilus influenzae* type b, *Streptococcus pneumoniae*, and human papillomavirus were recently approved after years of delay compared with other countries. Furthermore, Japan has continued to use a live, attenuated oral poliovirus vaccine, even though the government reported that 80 patients developed vaccine-associated paralytic poliomyelitis during 1989–2008 from the live vaccine.<sup>37</sup> Japanese domestic companies are trying to develop combined vaccines including inactivated poliovirus under the guidance of the Ministry of Health, Labour and Welfare.<sup>38,39</sup>

Delays in approval of drugs and devices are not only the consequences of cost containment policy,<sup>35</sup> but result from structural problems. Some of these problems in delayed approval could be addressed through a modernisation of the regulatory system, a fair pricing system, a formal cost-effectiveness evaluation system for approval decisions, and improved clinical research capacity by government and academic hospitals.

financed by social insurance premiums, a quarter comes from the central government's general revenues and constitutes 10% of its budget.<sup>26</sup> Since this amount would increase as health expenditures increase over time with the ageing society and advances in medical technology, the government must control total health expenditures so as to contain the overall budget. Budget constraints have been severe ever since Japan's economic bubble burst in 1991. Since then, the country's national debt has accumulated to twice the gross domestic product.<sup>27</sup> Thus, on the one hand, health-care costs will become increasingly difficult to contain, and on the other hand the government does not have the capacity to increase funding. Worse, the emergent budget for reconstruction and compensation of the triple-disaster-hit areas will further increase fiscal pressure on government (figure 1).

Second, Japan is "a despondent country with a dysfunctional political system", according to *The Economist*.<sup>28</sup> The chaotic national management of the recent nuclear power plant crisis shows the need for stronger political leadership and greater transparency in decision making. After the disasters occurred on March 11, 2011, the government created many official task forces that contributed to inefficiencies in the government response. The untimely and contradictory disclosure to the public of information about the risks of radiation and the extent of damage at the power plant

helped create public confusion and mass panic, and contributed to raising distrust in the government.<sup>29</sup> Academics who sat on government committees were also criticised for their ineffectiveness, inappropriate risk assessments, and unclear messages to the public as a result of poor communication skills and conflicts of interest between the government and the nuclear power industry. The official response to the disasters showed Japan's antiquated institutional mechanism for policy making, which is characterised by fragmented relations and competition among the different ministries and agencies, and close ties among industries, academics, and governmental bureaucrats within a specific area as exemplified by the nuclear energy policy. The confused official response has been worsened by mutual mistrust between bureaucrats and politicians in the government led by the Democratic Party of Japan. The disaster also showed the legacy of ineffective regulation of the nuclear power industry from decades of government by the Liberal Democratic Party.<sup>30</sup>

Last, Japan's health system is not responding to people's changing expectations about health and increasing demands for good-quality services, particularly in an interconnected world. This trend has raised national debates about several medical issues. For example, reports about the health hazards of drugs, followed by a series of lawsuits, brought modernisation of the drug and device regulatory system.<sup>31,32</sup> However, the delayed approval of new drugs, devices, and vaccines frustrates doctors and patients (panel 2). These trends indicate increasing tensions and conflicts among medical workers, patients, and the mass media in Japan's health system.

The Japanese Government in 2009 recognised the strategic importance of the specialty of life innovation that seeks to bring together economic growth, science and technology, and quality of life in an ageing society.<sup>40</sup> That policy, approved in 2009 by the cabinet, promotes scientific research in life sciences, informatics, and genomics in pursuit of innovations that will improve diagnosis and treatment of disorders that affect ageing societies.<sup>41</sup> We welcome this technology-driven and growth-oriented approach to consider health as a prominent economic sector.<sup>42,43</sup>

Despite a continuous increase in the number of physicians, there is a shortage of physicians in some specialties, especially obstetrics, paediatrics, and surgery.<sup>44,45</sup> Shortages in some specialties are further compounded by changes in patients' views about the quality of service and non-medical aspects of care (eg, respect for individuals and client orientation).<sup>46</sup> Patients have become increasingly sophisticated in their understanding about quality and physicians,<sup>47</sup> whereas physicians have not been able to keep pace with these changes. Even for low-risk operations, many patients now seek care from specialists in tertiary hospitals. In terms of emergency care provision, Japanese society, including parents, general internists, and

emergency care physicians, seems to insist on children being seen by a paediatrician and not by an internist on duty.<sup>48</sup> These expectations, with the poor differentiation in service provision and misdistribution between specialties, have created bottlenecks in major medical centres, especially for emergency care. Because patients' expectations have changed, the roles of primary care physicians and specialists and the balance between them need to be adjusted.

Although Japan's current system might be making people healthier, it does not seem to be able to meet rising expectations. In this context, Japan needs to reconsider the meaning of health in an ageing, uncertain, and global context. In particular, Japan needs to give greater attention to people's values about health and to develop a coherent vision as a leader in global health. To address these challenges, we believe that Japan must undertake a major restructuring of its health system.

### Reforms for the future

A broad consensus exists in Japan today about the need for reforms in health (as in many other areas of national policy), but little agreement on what to do or how to do it. Japan seems to have lost its capacity to make tough social decisions that impose costs on some stakeholders. We propose four major reforms to assure the sustainability and equity of Japan's health accomplishments in the past 50 years (panel 3).

First, implement a human-security value-based reform. Japan's health system continues to increase the national medical expenditures. Undoubtedly, Japan needs more funding for health, through increases in insurance premiums and taxation. However, the real concern is how Japan will ensure fairness in financial contributions while securing new sources of funding for health. This ability to ensure fairness, in turn, depends on informed judgments by the Japanese people.<sup>21</sup>

Structural reform inevitably represents the values that a nation intends to achieve. European countries established their health systems based on their particular values and their own political and historical contexts. In Japan, as in other non-western countries, government officials and politicians imported a health system and adapted it to their own context, but the process of adoption was eclectic and not necessarily internally consistent, thereby lacking a structural mechanism to retain and improve its quality.

As discussed in the report about global health,<sup>18</sup> Japan made human security the cornerstone of its foreign policy because it understood the interdependence of political, economic, and social development. The Japanese health system that had worked in the past has begun to fail, and is now threatening human security within Japan, as exemplified by the recent disaster. Human security—to protect all human lives from critical and pervasive threats and give people the building blocks

#### Panel 3: Summary of key policy recommendations

##### 1 Implement a human-security value-based reform

- Apply the notion of human security with increased proactiveness to Japan's domestic policies
- Refine governmental health policies in medical education, system monitoring, and assessment from the people-centred perspective
- Maintain the basic structure of compulsory enrolment in the social health insurance plan, based on the underlying value attached to equity in Japanese society
- Use good-quality research and scientific evidence to frame key choices in local, national, and global decision making

##### 2 Redefine the role of central and local governments

- Transfer the authority and responsibility for improving the efficiency of allocation of health-care resources and sustainability of funding to prefectural governments
- Consolidate fragmented agencies and institutions (eg, Japanese version of the Institute of Medicine, Centers for Disease Control and Prevention, and National Institutes of Health)
- Reconstruct health systems in Tohoku area damaged by the Great East Japan Earthquake as the test case for future reforms based on human security

##### 3 Improve the quality of health care

- Build clinical databases to certify subspecialties to improve quality of physicians
- Establish general practice as an official subspecialty for patient-centred seamless care
- Monitor performances with mandatory reports for benchmarking
- Enable functional differentiation and the establishment of referral networks in clinics and hospitals

##### 4 Commit to global health

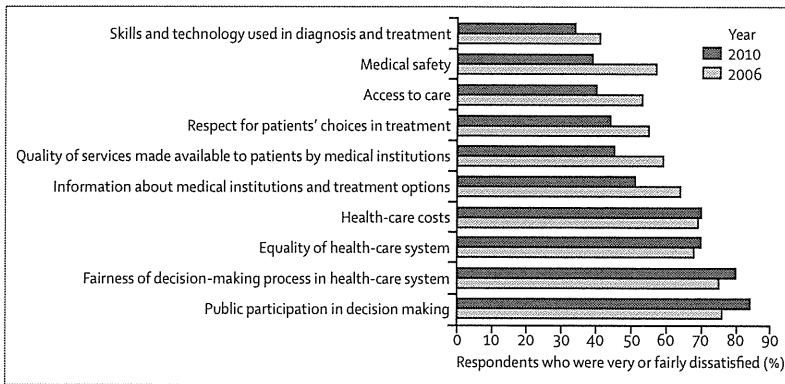
- Provide opportunities for domestic and global health experts to interact
- Mobilise Japan's accumulated knowledge, especially of the universal coverage, ageing and long-term care, and health and wellbeing for the past 50 years in the global health context

of survival, livelihood, and dignity<sup>49</sup>—such as universal insurance coverage, is more relevant than ever to meet the challenges facing Japan. Towards this end, we believe that Japan needs to apply this idea more proactively to its domestic policy. Health, as a common goal at the basis of our shared humanity, is uniquely positioned to play a major part in Japan's pursuit of human security for its own people.

Japan needs to begin reform by clearly stating the shared values that need to be achieved through the health-care system, and adhere consistently to them. We believe that equity in human security should be the core value of Japanese health policy, but it will require new commitments from every stakeholder. The basic structure of compulsory enrolment in social health insurance plans should remain, though structural reform through consolidating plans and setting fair premiums is a necessary step to improve equity.

As the era of Japan's post-war decision-making system comes to an end, a more transparent process needs to be implemented to better represent people's values. A 2010 opinion poll suggests that the major sources of the dissatisfaction with the Japanese health system are not





**Figure 2: Main reasons for dissatisfaction of Japanese population with the health-care system**

A public opinion survey on health-care policy was done in January, 2010, by Japanese experts.<sup>50</sup> Two-stage cluster sampling of 1650 individuals (aged  $\geq 20$  years) was used to gather information about public opinion on various aspects of health-care policy. The overall response rate was 62%. When compared with a survey in 2006 with the same set of questions, the results of the recent survey suggest that over the past few years, public dissatisfaction with the decision-making process of the health-care system has increased, while public satisfaction with the medical services and treatments has increased.

issues about quality, access, or costs, but the lack of fairness and public participation in decision making (figure 2).<sup>50</sup> Behind this lack of fairness and public participation in decision making is the lack of appropriate use of evidence. Decision making—whether local, national, or global—will always remain political, but it can still be informed by better science and evidence to frame key choices, especially approaches that take into account the overall context.

Although a general social agreement exists about the need for structural reform, no one is willing to take the political risk to break the policy inertia and transform the health system. The system's inefficiencies could be tolerated in Japan's period of high economic growth, but not in today's climate of economic stagnation. We believe that a bold alliance of stakeholders across political parties and positions, beyond the vested interests of individual groups, is needed to stimulate structural reform of Japan's health system.

Second, redefine the role of central and local governments. The notion of human security requires both top-down and bottom-up approaches to reform Japan's health system. From the top-down perspective, Japan needs central policies that give more emphasis to people-centred health interactions by breaking down the ministerial silos of authority and responsibility. The greatest barrier to reform is Japan's antiquated and entrenched institutional mechanisms for health-policy making that provide few opportunities for domestic and global health experts to interact. Towards the goal of providing independent and robust analyses of both domestic and global health policies, Japan needs to establish agencies such as the Centers for Disease Control and Prevention, National Institutes of Health, and Institute of Medicine in the USA, and National Institute of Clinical Excellence and Public Health in the UK. At the

same time, from the bottom-up perspective, Japan needs to empower regional and community planning entities that can expand autonomy for the regions. Design and implementation of these changes will require new kinds of dialogue and decision making among groups that have not previously collaborated, including the medical association, government organisation, private industry, and civil society groups.

Japan's health policy is decided uniformly by the central government and with little discretion from the local governments. Therefore, at the local level, prefectural governments should serve as the key organisations for citizens to participate in forming and implementing health policy. The first step would be the election of politicians who are committed to managing and sustaining the regional health-care system. The consolidation of the social insurance plans at the prefectural level would not only improve fairness of each organisation's financial contribution, but also enhance the authority of the prefectural governors. Their mandate would be to exercise tighter control over provision of care to improve efficiency in the allocation of health-care resources and their functions in the region. Providers' performance must be monitored, and hospitals and clinics should be consolidated to improve efficiency.

The triple disasters—earthquake, tsunami, and nuclear crisis—that Japan is now confronting in the Tohoku area have created the nation's worst humanitarian crisis since World War 2. Remote villages along the coast hit by the tsunami are among the regions with the fastest ageing populations in Japan. The prevalence of hypertension and diabetes is high among survivors, and there is a chronic shortage of health workforce and little access to quality care.<sup>51</sup> In these areas, the major issues for the Japanese health system—ie, ageing population, chronic disease, little access to quality services, and lack of a health workforce—have been magnified after the disaster. This confluence of crises represents one possible future scenario for all Japan. Thus, reconstruction of the health system in the Tohoku area represents a test case for future reform of the Japanese health system. We believe that rebuilding the health system in Tohoku provides an opportunity for a positive reform of the Japanese health-care system based on the notion of human security.

Third, improve the quality of health care. Japan lacks systematic measures and incentives to improve quality.<sup>52</sup> The accreditation system of subspecialties is not well established—physicians are free to proclaim and practice any specialty they desire, and national quotas for training subspecialists based on the expected need, and the resources for meeting the required level of experience do not exist.<sup>17</sup> Although the subspecialties are under the general organisation of the Japanese Board of Medical Specialties,<sup>53</sup> the board does not have the authority to set quotas or standardise accreditation requirements. Subspecialty organisations should start by setting such quotas and building clinical databases, such as those that

have been developed by the Japanese Society of Thoracic Surgery and other subspecialties.<sup>54</sup>

The lack of quotas has led to the training of too many subspecialists. Only a small proportion continue and choose a career in their subspecialties and the rest shift to general practice without formal training as family doctors. General practice is not established as a subspecialty because few medical schools in Japan have a department of primary care or general practice. It is the underlying reason why continuity and comprehensiveness of primary care remains poor in the Japanese health system.<sup>11</sup> To address this mismatch in training and practice for physicians, Japan requires a long-range reform of medical education,<sup>55,56</sup> which could include a retraining programme for general practice for subspecialty physicians as a postgraduate educational system in medical schools. This programme should emphasise skills in communication with patients, management of team practice, and coordination of local health-care resources to improve accountability for local health outcomes.

To effectively allocate subspecialty physicians and other resources, a regional planning committee composed of providers, local government, and citizens should be organised. The quality of hospital performance should also be monitored through mandatory reports that are automatically downloadable from a national hospital information system. This monitoring would enhance quality through peer competition. The reporting system for hospitals participating in the case-mix prepayment system already provides the basis for creating an effective hospital monitoring system.<sup>57</sup> Small hospitals mainly providing chronic care should be further encouraged to become skilled nursing facilities or cared housing units.

Once professional and hospital organisations have shown the public that they have committed themselves to improve quality and shown their willingness to make their efforts transparent, they would be in a better position to demand increased resources for health care. This demand would be an issue at the national and prefectural levels.

Fourth, commit to global health. The key strategic agenda for Japan is to reconsider the meaning of global health in ageing populations and to identify areas in which Japan has greater expertise. This *Lancet* Series has showcased the wealth of knowledge and expertise for health and health systems, especially related to universal coverage, that Japan has accumulated in the past 50 years in its quest to improve the health and wellbeing of its people. The Japanese experiences and expertise are highly relevant in an era of scaling up interventions to achieve the health-related Millennium Development Goals (MDGs). Additionally, Japan's experience and knowledge related to health insurance and long-term care<sup>10,17,20</sup> will be huge assets in the post-MDG movement of global health towards universal coverage and long-term care in ageing societies.<sup>2,18</sup> These assets should be used by expanding and deepening Japan's financial and

substantive commitments through overseas development assistance. That is, not cut back, despite the pressing demands for reconstruction after the disaster.

## Conclusions

Can we do all the tasks presented in these four reforms? Our belief is that Japan must and can. Our four reforms are not independent. Indeed they must be done simultaneously. Human security would be the unifying theme to reform the structure of the central and local governments. Once the responsibilities of the central and local governments are more clearly defined, with more evidence of professional accountability made available, then the public would be more willing to allocate additional resources to health care. To enable this transformation, we have advocated the consolidation of plans for social health insurance at the prefectural level so that their premiums could be linked more directly to the delivery system.<sup>10</sup> When the first three goals are achieved, Japan would be in an improved position to expand its commitment to global health.

The need for change has become more urgent after the disaster of March, 2011. Our recommendations must be adopted now and implemented in 3–5 years. This time is not just for reform but also for rebirth. The issues have become too critical to rely on incremental adjustments that have characterised Japanese policy making. We should take note that Japan's past calamities have often been followed by major changes.<sup>28</sup> After the Great Kanto Earthquake of 1923, Japan turned to militarism. After defeat in World War 2, and the dropping of the atomic bombs by the USA, Japan adopted a pacifist constitution in 1947 and achieved peaceful growth. After the Great Hanshin-Awaji (Kobe) Earthquake in 1995, Japan turned inward forcefully. Similarly, Japan's recent catastrophe could have a huge effect on the nation's future.<sup>28</sup> We believe those forces of change must be channelled in a positive direction.

Already, the signs are promising. In response to the crisis, Japan has had an outpouring of passionate young people who are committed to helping those devastated by the disasters. Using innovative social media, they have gathered and diffused information, garnered support for projects, and launched massive donation campaigns.<sup>58</sup> The Japanese version of a new public movement is underway, led by agents for innovative change, hoping to move the system from centralised decision making to a more decentralised people-oriented approach. The crisis has also shown that Japan still shares a strong sense of social cohesion, trust, and reciprocity. Human security approaches to disaster relief and health-care provision for all can be the foundation of Japan and the world in the 21st century.

During this difficult period, Japan has received generous support from all over the world. The time now is for Japan to give back to the global community. We propose that Japan should act as a platform for research

and development of health systems and innovations, drawing lessons from all over the world about universal coverage, equity and healthy ageing in the context of human security, humanitarian responses to disasters, and health effects of radiation exposure. We believe this *Lancet* Series initiates a new era in which these hurdles can be overcome, and that broader lessons can be learned from Japan's successes and problems of the past 50 years.

#### Contributors

KS, MRR, HH, and NI set the conceptual framework for the report, and KS, HH, AN, and TT did the literature search. KS, HH, NI, and MRR contributed to writing the report. AN, TT, HM, KT, and MRR contributed to the 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 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

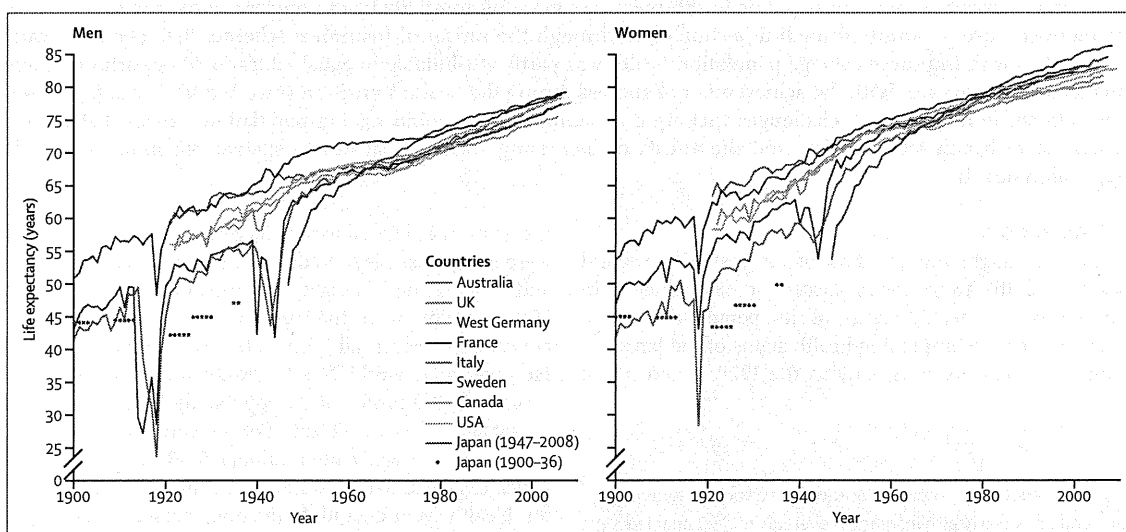
### Key messages

- 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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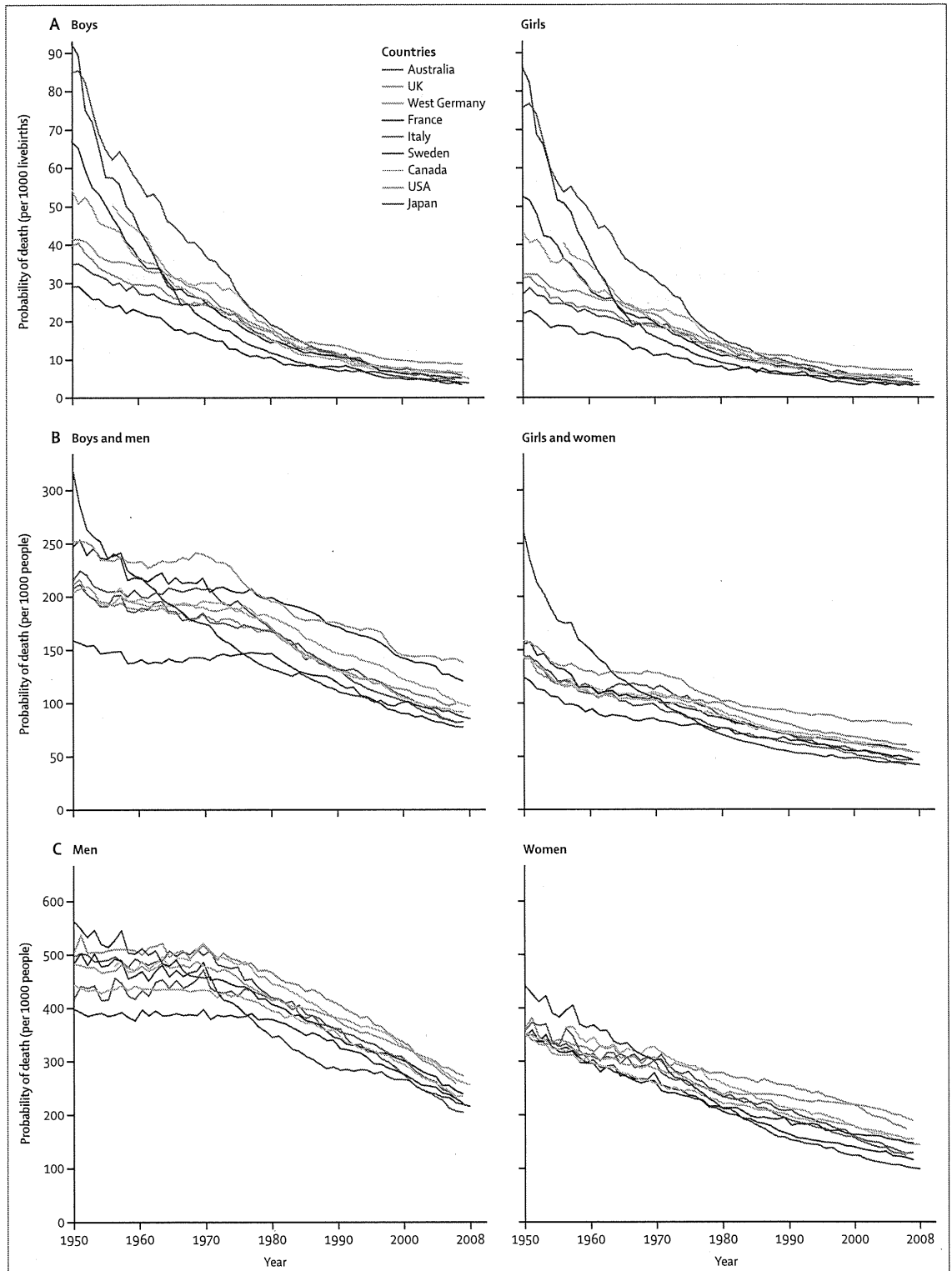


Figure 2: Trends in the probability of death at age younger than 5 years (A), 15-60 years (B), and 60-75 years (C) in Japan and selected countries during 1950-2008  
Data from University of California at Berkeley and Max Planck Institute for Demographic Research.<sup>7</sup>

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>17,24</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

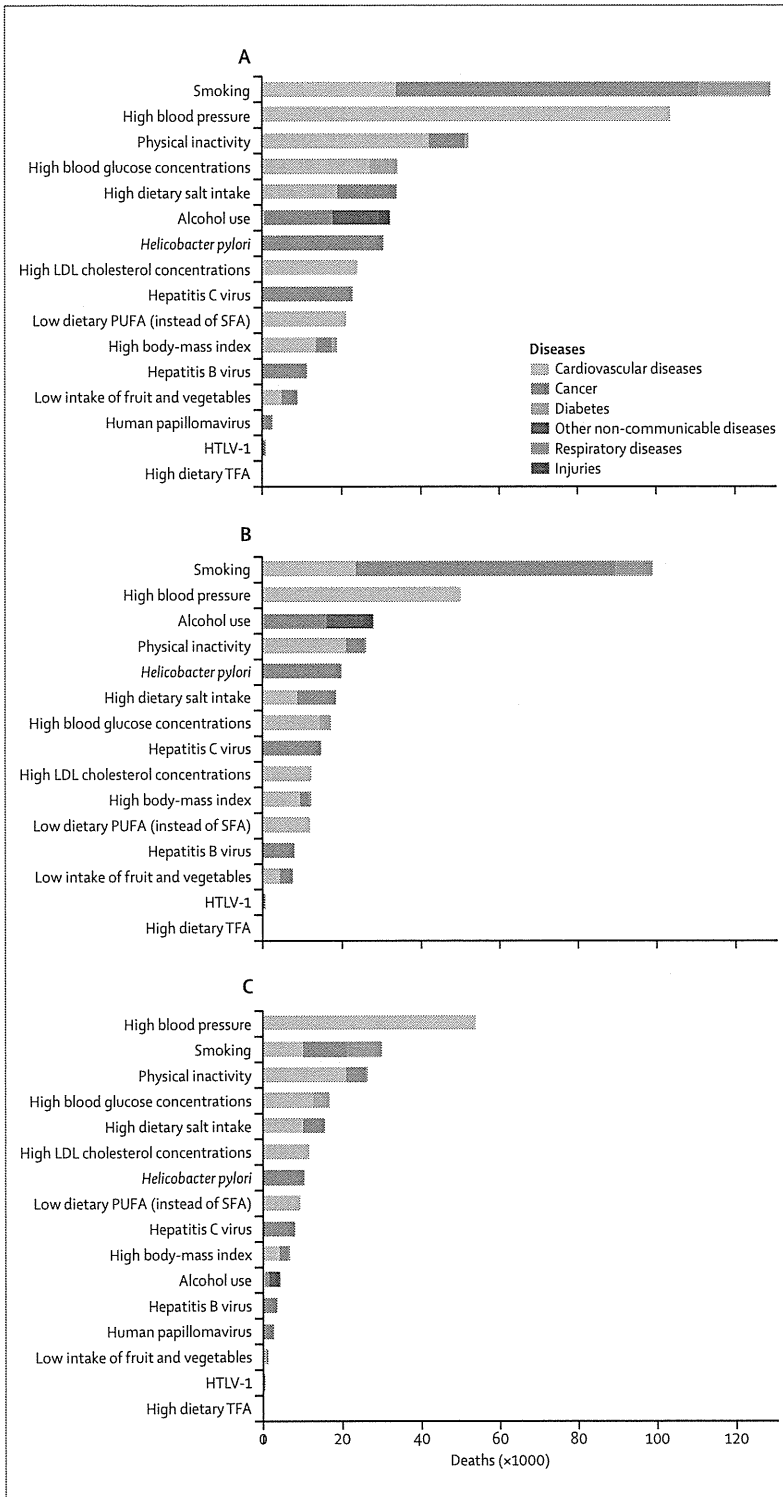
Japan's success in terms of the increased life expectancy of its population is unlikely to have resulted solely from the achievement of good access to health care. Instead, other cultural background factors might be involved. Marmot and Smith<sup>42</sup> hypothesised that the way Japanese people relate 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>57</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