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Sustainability and Resilience in Japan's Health System

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Executive summary

Introduction

In recent years, Japan has confronted many social issues, including a declining birth rate, an ageing population, rising poverty, social inequality, and social isolation. These challenges have arisen as Japan is also experiencing a paradigm shift in its values, culture, and economy, including changes in lifestyles, increased employment of foreigners, and advancements in information technology (IT). Although Japan is often considered to have achieved and maintained universal health coverage (UHC) since implementing its universal health insurance system half a century ago, it continues to face problems such as healthcare service disparities across regions, and barriers to healthcare access for socially vulnerable people. UHC in Japan is under more severe threats than ever, owing to an increase in healthcare costs and the unprecedented crisis of the coronavirus disease 2019 (COVID-19) pandemic, as well as the existence of emerging and continuing threats to health, such as climate change, antimicrobial resistance, and risks of future geopolitical conflicts. Consequently, Japan has reached a critical juncture in its health system, whose future success urgently requires re-evaluation of the system's sustainability and resilience. Therefore, this report analyses Japan's health system, and provides guidance regarding the critical actions required to realise a broad vision for the success of the health system by the year 2040.

Created as part of the Partnership for Global Health Resilience and Sustainability (PHSSR), this report evaluates the sustainability and resilience of the health system in Japan according to the following seven domains:

- Governance
- Financing
- Workforce
- Medicines and technologies
- Service delivery
- Population health and health promotion
- Environmental sustainability

In this report, sustainability refers to the health system's ability to improve population health by continually delivering the following key functions: stewardship; providing services; generating resources; financing; and incorporating principles of financial fairness, equitable access, responsiveness, and efficiency of care. Additionally, sustainability requires these key functions to be performed in an environmentally sustainable manner. Resilience refers to the health system's ability to prepare for, absorb, adapt to, learn from, transform in response to, and recover from crises arising from short-term shocks and stresses, to minimise their negative effects on population health and the disruption of health services.

Findings: key themes for sustainability and resilience

We analysed the strengths of, and underlying issues in, the current health system in Japan. Our findings are summarised in Table 1.

Table 1: Sustainability and resilience – summary of findings by key domains

DOMAIN 1 GOVERNANCE		
Strengths	**Sustainability**	**Resilience**
	↑ The Japanese Digital Agency was recently launched to provide national guidance and support for digitisation across society, including healthcare. ↑ A comprehensive social support system for preventive, medical, and caregiving services for older adults has been established through Japan's Community-based Integrated Care System and the Long-term Care Insurance system.	↑ As part of Japan's response to the COVID-19 pandemic, public health organisations (e.g., public health centres, health consultation offices, and quarantine stations) helped prevent the spread of infections by quarantining infected individuals, performing contact tracing, and testing for infections.
Weaknesses	**Sustainability**	**Resilience**
	↓ Local governments and private medical establishments provide services, whereas the central government is responsible for policy and financial budgeting. This complex structure hinders effective coordination among stakeholders at different levels. ↓ Coordination is lacking in the health system among and within the ministries of the central government, and among central and local governments. No central command organisation with a confirmed mandate has been established to oversee health system governance. ↓ Health governance at the municipal level is weak. ↓ Evidence-based health policymaking decisions and policy evaluations are insufficient, partly because of slow progress in the disclosure and use of health-related data.	↓ Transparency regarding policymaking decisions in Japan's response to the COVID-19 pandemic has been limited. The central government has faced criticism from Japanese citizens for poor accountability related to these policies. ↓ The central and local governments cannot adjust and redistribute medical resources across the nation in an agile manner. ↓ Japan lacks a strong public health organisation that can support policymaking decisions based on scientific information. This issue is present even in the absence of health crises, such as the COVID-19 pandemic, in Japan.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 2 FINANCING		
Strengths	**Sustainability**	**Resilience**
	↑ Japan's universal health insurance system has enabled the population to achieve a high standard of health by ensuring access to necessary services with low out-of-pocket costs. ↑ Expenditure is controlled by the central government through price adjustments within Japan's nationwide uniform medical fee reimbursement system.	↑ The public has continued to receive regular medical services, even during emergencies such as the COVID-19 pandemic or the 2011 Great East Japan Earthquake, because of emergency financial support provided by the Japanese government.
Weaknesses	**Sustainability**	**Resilience**
	↓ Japan's fiscal deficit is growing because of rapidly increasing social security expenditures and an imbalance between the amount paid into the social security system by the public and the costs associated with the services received. ↓ Increasing expenditures due to the COVID-19 pandemic have increased Japan's cumulative deficit. However, little national dialogue has discussed the drastic reform policies needed to achieve fiscal stability. ↓ Healthcare payments in Japan are made on a fee-for-service basis instead of a value-based payment system, thereby contributing to widespread overmedication, polypharmacy, and prolonged hospital stays. This system has reportedly hindered the optimisation of health expenditures. ↓ Efforts to improve cost-effectiveness performance at the institutional and regional levels through performance reviews have been insufficient. ↓ No currently existing organisation or committee in Japan, such as a social security advisory board, allows for open debate and impartial analysis of health financing.	↓ Actions have been insufficient to ensure that socially vulnerable people, such as those who are impoverished or foreign workers without health insurance, can access healthcare services. This problem is particularly important, given the concerns regarding increased job losses among these groups as a result of the COVID-19 pandemic. ↓ Government-led efforts to predict exposure risks from epidemics or pandemics have been insufficient. Moreover, on the basis of the experience during the COVID-19 pandemic, no defined rules for the provision of emergency funds have been formulated, including those for the issuing of government bonds, and how they are to be redeemed and funded.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 3 WORKFORCE		
Strengths	**Sustainability**	**Resilience**
	↑ The central government has promoted measures to secure resources according to estimates of healthcare workforce supply and demand. ↑ The number of medical professionals per 1,000 people has been increasing and is approaching the average in the Organisation for Economic Co-operation and Development countries. The demand for medical care is met when Japan is not experiencing a health crisis.	↑ In response to the COVID-19 pandemic, Japan has taken measures such as remobilising retired individuals and shifting tasks to compensate for the shortage of medical professionals.
Weaknesses	**Sustainability**	**Resilience**
	↓ The number of medical professionals per hospital bed is low compared to that in other countries, partly because of the large number of beds in Japan, resulting in a thinly distributed workforce. ↓ Room exists for promoting skill mix and interprofessional collaborations to improve in labour productivity. ↓ The development of solutions using artificial intelligence or other information and communications technology to address the decreasing working population and increasing working hours among healthcare workers has not progressed. ↓ Healthcare professionals are unevenly distributed among clinical departments and regions. ↓ Limited progress has been made in training healthcare generalists (including general physicians) who can provide primary care, including care for older patients with multiple conditions. ↓ Healthcare professionals are not trained to promote positive health (i.e., healthful behaviour beyond disease prevention), thus hindering the ability of individual residents to actively manage their health and well-being.	↓ Because healthcare workers are widely dispersed among medical institutions and hospital beds, there has been a shortage of healthcare workers focusing on high-volume COVID-19 treatment. ↓ A lack of preparation, including training of specialised workers, creation of safety protocols, and other measures, has led to confusion regarding Japan's response to COVID-19, even at designated healthcare institutions. ↓ Staffing shortfalls in public health centres (which play an important role in the response to COVID-19 and are the first point of contact for citizens concerned that they might have been infected with the virus) has been an issue during the COVID-19 pandemic.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 4	MEDICINES AND TECHNOLOGIES	
Strengths	**Sustainability**	**Resilience**
	↑ New medical technologies are reviewed and approved by Japan's regulatory authority within approximately the same timeframe as those in the USA and Europe. ↑ Effective medical technologies are reimbursed via the public health insurance system and are accessible to all insured individuals.	↑ Japan has achieved rapid approvals for vaccines, vaccine procurement, and vaccination roll-out during the COVID-19 pandemic. ↑ In response to the COVID-19 pandemic, the Japanese government utilised digital technology, such as a COVID-19 contact-tracing application.
Weaknesses	**Sustainability**	**Resilience**
	↓ Health data are not fully utilised. Challenges include slow progress in: developing a nationwide electronic health record system, leveraging data from such a system, and the proactive use of health data by patients. ↓ Japan has been slow to advance and streamline healthcare using digital technology. The use of Software as a Medical Device, online consultations, and routine disease and health management using personal health records remains undeveloped, partially due to insufficient support and incentives from the system. ↓ Health IT infrastructure is not well developed, hindering the spread of new digital technologies even if they have been successfully introduced. ↓ The promotion of value-based care (the adoption and delivery of medical technologies according to patient value) has only just begun. ↓ The ecosystem supporting the research and development of medical technologies in Japan is weak, thus decreasing Japan's competitiveness in this field. Room exists for further innovation through collaboration with non-health industries. ↓ Medical supply chains face structural risks; for example, the manufacture of active pharmaceutical ingredients largely relies on factories outside Japan.	↓ In response to the COVID-19 pandemic, the conventional disaster health system (establishment of base hospitals for disasters and stockpiling of pharmaceuticals) has not effectively met the increased demand in several instances. Measures for predicting supply and demand and securing new supply sources have been inadequate. ↓ Japan fell behind Europe and the USA in research and development of vaccines and therapeutic pharmaceuticals related to COVID-19, owing to insufficient efforts before the pandemic. ↓ Digital technologies, such as the contact notification applications introduced during the COVID-19 pandemic, were not widely disseminated to the public, and their utilisation rate was limited.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 5	SERVICE DELIVERY	
Strengths	**Sustainability** ↑ The quality of advanced care in Japan is high compared to that in other countries. ↑ Patients conveniently have free choice of healthcare institutions.	**Resilience** ↑ No major disruption occurred in the provision of healthcare during the COVID-19 pandemic, partly because of the suppression of excess mortality in 2020. During 2021, the number of deaths due to home treatment might have increased, although verification is required.
Weaknesses	**Sustainability** ↓ Medical functions have not been differentiated, and the primary care system, including primary care physicians and general physicians, is particularly vague and undifferentiated. No policy governs the positioning and relevant rules and systems, as well as expenditures, for primary care within the larger health system. ↓ Medical care is inefficient, partly because of the large number of hospital beds and long hospitalisation periods. ↓ Substantial disparities exist in medical quality among regions. ↓ The concept of positive health – which promotes active management and development of individual health and well-being – has not been internalised by society. ↓ Efforts to develop an inclusive society in which no one is left behind have been insufficient. Japan should provide more social support for proactive health maintenance and well-being, while considering social determinants of health, such as poverty.	**Resilience** ↓ Japan has experienced a shortage of hospitals able to accept patients with COVID-19. Furthermore, a shortage of medical resources in hospitals serving patients with COVID-19 has interfered with provision of medical procedures for other diseases. ↓ The primary care sector has not adequately supported early diagnosis and prevention of the spread of COVID-19, partly because healthcare institutions have restricted patients suspected of having COVID-19 from receiving outpatient and inpatient care.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 6	POPULATION HEALTH AND SOCIAL DETERMINANTS	
Strengths	**Sustainability**	**Resilience**
	↑ The Japanese central government has promoted the prevention of lifestyle diseases and improvement in lifestyle habits through policies such as Health Japan 21. ↑ As part of the evaluation of Health Japan 21, the central government investigated the health of Japanese residents and observed steady improvements between 2013 – 2021, such as extension of healthy life expectancy, decreased health disparities, decreased age-adjusted mortality rate for cerebrovascular disease, and decreased incidence of hypertension.	↑ Scientific evidence has shown that national-level policy interventions to improve individual lifestyles have the potential to decrease metabolic syndrome, obesity, and cardiovascular risk in the long term.
Weaknesses	**Sustainability**	**Resilience**
	↓ Bias exists in the allocation of resources to health research that aligns with public health needs. Therefore, some research areas have not been adequately funded and sufficiently promoted. ↓ Preventive policy interventions for risk factors of non-communicable diseases – such as dyslipidaemia, metabolic syndrome, and diabetes mellitus, which were considered to be slow to improve in Health Japan 21 – have not progressed. ↓ Insufficient progress has been made in the provision of early education related to health, including concepts such as positive health. ↓ Countermeasures for declining birth rates, including public awareness, and education initiatives for life planning and sexual health are insufficient to address the population decline.	↓ The slow release of epidemiological data has hindered analysis of changing circumstances during the COVID-19 pandemic and prompt policy changes in response.

Table 1 (continued): Sustainability and resilience – summary of findings by key domains

DOMAIN 7	ENVIRONMENTAL SUSTAINABILITY	
Strengths	**Sustainability** ↑ Environmental policies and actions in Japan have been praised internationally.	**Resilience** ↑ Climate change adaptation measures have been introduced. For example, heat wave forecasts and alerts, and environmental education have been implemented.
Weaknesses	**Sustainability** ↓ Goals and measurement methods for the direct and indirect healthcare climate footprint of Japan's health system have not been well established. ↓ Efforts toward achieving carbon neutrality within the health system have been inadequate. Collaboration is not sufficient among stakeholders in terms of introducing medical technologies and measures for healthcare institutions to reduce the system's climate footprint. ↓ Public awareness and evidence-based developments are lacking regarding environmental issues to promote planetary health.	**Resilience** ↓ A need exists to develop and implement adaptation measures and a co-benefit approach (i.e., simultaneous achievement of measures beneficial in terms of both climate change and public health) in response to health risks caused by climate change.

On the basis of consideration of the results across the seven domains, this report proposes four major concepts for enhancing the foundations of the health system to improve its resilience and sustainability, while responding to the rapidly decreasing population and the needs of Japan's ageing society. The four major concepts are (1) the pursuit of well-being, (2) the promotion of positive health, (3) the promotion of social inclusion, and (4) the use of data and digital technology. The four concepts are described in detail below.

1. Pursuit of well-being

The goal of Japan's social system is the achievement of a favourable state in which individuals are healthy not only physically but also in terms of mental and social well-being. Japan has the world's highest average life expectancy because of its robust health system. However, it now must focus on supporting individual well-being by providing integrated medicine, nursing care, and welfare services.

2. Promotion of positive health

The concept of positive health (healthful behaviours beyond mere disease prevention) promotes the active management and development of health and well-being, thus helping people respond independently to physical, mental, and social issues, instead of passively receiving healthcare services from the system. To attain positive health, residents are encouraged to pursue an empowered way of life, including educating themselves regarding health, and becoming aware of

their own health, e.g., judging whether their health is good or poor, and assessing the most suitable treatments. Once empowered, individuals can have more fruitful discussions with healthcare workers, be actively involved in prevention and treatment decision-making, and identify individual health and well-being goals tailored to their social status, values, and lifestyles.

3. Promotion of social inclusion (building a society in which no one is left behind)

The COVID-19 pandemic has exposed the deficiencies within Japan's UHC in its current form, particularly its inability to provide sufficient support to the poorest segments of the population. The economic damage caused by the COVID-19 pandemic has highlighted that many people, including those who are unemployed, single parents, young carers, and foreign labourers, are unable to achieve well-being and receive healthcare as they struggle with poverty. This problem has reaffirmed the importance of considering social determinants of health (SDOH) and building a society in which no individual is left behind (social inclusion).

4. Use of data and digital technology

Japan is lagging behind other countries in its use of data and digital technology. Improvements in this area will provide critical infrastructure for achieving well-being, positive health, and social inclusion. Japan will need to collect and analyse personal health data to provide optimal health services to the public in the future. Data should also be used to scientifically analyse both the processes and outcomes associated with healthcare services, to improve the overall quality and efficiency of the health system. Although Japan established the Digital Agency in 2021 to take the lead in shaping a digital society, stronger leadership will be required to accelerate progress in Japan's digital revolution.

Together, the four concepts described above create a vision referred to as better 'co-being' [1]. Japan's existing health system has achieved near complete UHC, and individuals can receive healthcare services of adequate quality when necessary, at a reasonable cost. However, in the future, Japan clearly must continue to evolve and achieve better co-being, so that all individuals are ensured equality and inclusion, and can realise all-round well-being throughout the life course [1]. The development of an inclusive architecture for well-being is crucial for achieving better co-being. Japan should aim for a society in which value-based, people-centred healthcare is provided to the entire population (leaving no one behind) through data utilisation and digital transformation, thus empowering individuals to design their own lives.

The social issues that Japan is facing, such as ageing and social inequality, are likely to become global challenges in the future. Japan, as a global health leader, will ideally find solutions for these issues, through learning from its experiences during the COVID-19 pandemic and from other countries, and constructing a more sustainable and robust health system. Japan should present a model for future health systems to the rest of the world, promoting an inclusive architecture for well-being, in which every individual can achieve better co-being.

Recommendations

In this report, several recommendations are made to increase the sustainability and resilience of the Japanese health system, according to the vision of better co-being and its underlying concepts: (1) the pursuit of well-being, (2) the promotion of positive health, (3) the promotion of social inclusion, and (4) the use of data and digital technology. Table 2 provides an overview of these recommendations.

Table 2: Recommendations across the seven domains

DOMAIN 1	GOVERNANCE
1A	Develop a strong data-driven culture, and make data the universal basis for policy decision-making
1B	Create a bold and powerful national-level, data-driven command centre that can promote governance to overcome bureaucratic mindsets
1C	Promote transparency in policy decision-making processes
1D	Organise and improve the chain of command for risk and crisis management
1E	Ensure the ability of the Japan CDC to respond to health crises such as infectious disease outbreaks
1F	Promote health data use by developing health data infrastructure making data publicly available

DOMAIN 2	HEALTH SYSTEM FINANCING
2A	Secure public financial resources to support the sustainability of the health insurance system, including consideration of additional taxation on significant health risks (e.g., tobacco, alcohol, sugar, etc.)
2B	Standardise insurance premiums (rates), and stabilise finances by promoting the integration of insurers
2C	Re-evaluate health co-insurance rates and coverage for health insurance reimbursement
2D	Promote and expand access to healthcare services for socially vulnerable populations
2E	Expand the outcome-based reimbursement payment system
2F	Evaluate the performance of healthcare institutions on the basis of evidence, and review healthcare fee structures
2G	Establish a social security advisory board to provide unbiased and objective guidance on government healthcare finances
2H	Establish resources, including finance procurement and risk evaluation methods for new and emerging infectious diseases

Table 2 (continued): Recommendations across the seven domains

DOMAIN 3	WORKFORCE
3A	Secure healthcare workforce resources by expanding the hiring of foreign labour and using new technologies, such as artificial intelligence and information and communications technology
3B	Streamline healthcare through the redistribution of healthcare professionals and skill mix
3C	Improve the well-being of healthcare workers
3D	Promote patient-centric healthcare, and educate healthcare professionals to support positive health
3E	Establish a healthcare provision plan for the presence and absence of health crises in Japan, to prepare for possible future pandemics and natural disasters

DOMAIN 4	MEDICINES AND TECHNOLOGY
4A	Promote health technology assessment based on value to patients
4B	Promote optimised use of pharmaceuticals
4C	Secure supply chain stability for pharmaceuticals and other medical resources
4D	Develop a health information technology architecture in which individuals' various health records are linked and shared nationwide
4E	Promote digital health technology that provides value for the public
4F	Develop an innovation ecosystem for healthcare that is internationally competitive
4G	Evaluate research and development of pharmaceuticals and health technologies by using prevention and promotion of health as indicators
4H	Establish financial and research and development support guidelines in preparation for states of health emergency

DOMAIN 5	HEALTH SERVICE DELIVERY
5A	Improve the efficiency of healthcare service delivery by reducing unnecessary hospital stays and healthcare visits
5B	Enhance the functioning of primary care teams (multi-disciplinary teams of healthcare professionals, including primary care physicians and general physicians)
5C	Promote policies to solve healthcare inequalities among regions
5D	Support health promotion, and reimagine healthcare as a social system that allows individuals to make independent decisions regarding their health and life choices
5E	Promote policies considering SDOH to reduce inequalities in healthcare
5F	Develop national guidance that clearly outlines the roles and responsibilities among sectors of the healthcare system during health crises

Table 2 (continued): Recommendations across the seven domains

DOMAIN 6	POPULATION HEALTH AND SOCIAL DETERMINANTS
6A	Establish a national system for the rapid disclosure of mortality statistics that enables rapid feedback and analysis at the local level
6B	Promote allocation of resources for research and activities that are data driven and in line with public health needs
6C	Intervene to reduce major risk factors for non-communicable diseases
6D	Promote preventive healthcare services
6E	Implement early education in schools regarding the prevention of non-communicable diseases
6F	Promote measures to provide family planning and reproductive health education and services for young people.

DOMAIN 7	ENVIRONMENTAL SUSTAINABILITY
7A	Evaluate the environmental costs of the entire health system, and promote appropriate responses
7B	Set incentives and goals to reduce the health system's climate footprint
7C	Implement and develop environmentally friendly technologies in cooperation with non-healthcare industries
7D	Promote co-benefits and adaptation measures for health problems caused by environmental degradation
7E	Enhance international cooperation for the sustainable use of genetic resources
7F	Enhance evidence and the Japanese public's awareness of environmental issues regarding the promotion of planetary health

1. Introduction

In recent years, Japan has confronted many social issues, including a declining birth rate, an ageing population, rising poverty, social inequality, and social isolation. These challenges have arisen at a time when Japan is also undergoing a paradigm shift in its values and culture, including changes in lifestyles, increased employment of foreigners, and advancements in IT. Although Japan is often considered to have achieved and maintained UHC since implementing its universal health insurance system half a century ago, it continues to face problems such as disparities in healthcare services across regions, and barriers to healthcare access for socially vulnerable people. UHC in Japan is under more severe threats than ever, owing to an increase in healthcare costs and the unprecedented crisis of the COVID-19 pandemic.

Scrutinising the issues associated with Japan's current health system, in addition to its experiences with COVID-19, will be important in building a health system that is highly resilient against future emerging challenges, such as climate change, antimicrobial resistance (AMR), geopolitical uncertainty, and the risk of future pandemics.

This report takes a broad view of the health system, including medical care, welfare, nursing care, and residents. After 2025, Japan will face a rapid decrease in the working-age population rather than a rapid increase in older people. Therefore, this report analyses changes in the population structure, moderate- to long-term healthcare needs and necessary resources, and the socioeconomic landscape. The results of the analysis are used to provide advice on actions in the near future, on the basis of a broad vision for achieving a successful health system by the year 2040. Our aim is not only to describe short-term measures but also to propose ideas guiding long-term vision and directions.

This report is part of the PHSSR. The pilot phase of the PHSSR, which ran from August 2020 to January 2021, led to the development of a framework covering five core domains to enable rapid system-level analysis of health systems in the eight pilot countries. This report assesses the sustainability and resilience of Japan's health system according to the seven domains addressed in the PHSSR pilot framework:

- Governance
- Financing
- Workforce
- Medicines and technologies
- Service delivery
- Population health and health promotion
- Environmental sustainability

In this report, as specifically developed and defined in the pilot framework of PHSSR, sustainability refers to the health system's ability to improve population health by continual delivery of the following key functions: stewardship; providing services; generating resources; providing financing; and incorporating principles of financial fairness, equitable access, responsiveness, and efficiency of care. In addition, sustainability requires that these key functions be performed in an environmentally sustainable manner. Resilience refers to the health system's ability to prepare for, absorb, adapt to, learn from, transform in response to, and recover from crises, borne of short-term shocks and cumulative stresses, to minimise their negative effects on population health and the disruption of health services.

The report additionally includes two case studies, which represent innovative and effective initiatives that have positively contributed to health system resilience and/or sustainability in Japan: a health system that can realise social inclusion in which no individual is left behind (Section 9) and a social system that supports positive health throughout the life course (Section 10).

To inform this report, we conducted an extensive literature review and explored relevant statistics. Source types included academic publications, and grey literature from government agencies and national and international organisations. We also convened 10 advisory board members, and the report was subsequently peer-reviewed three times by one or two members in each of the seven domains. All members also reviewed the overall direction of the report, contributed to the discussions, and reviewed and approved the final version of the report (each advisory board member and the domains for which they were responsible are listed in the acknowledgements).

This report mainly targets health policymakers and the general public worldwide, and focuses on describing Japan's vision for its future health system and which policy recommendations will be necessary to achieve this vision. To implement policy recommendations, the authors will make concurrent efforts to promote advocacy activities that develop concrete policy recommendations for Japan, according to the key findings and policy recommendations identified in this report.

2. DOMAIN 1
Governance

For Domain 1, this report addresses the methods that should be considered for the enhancement of governance functions, derived from analyses of the governance structure, public health, health and social care activities – including medical, nursing care, and welfare services – responsibilities and accountability, and response structures during the COVID-19 pandemic.

2.1 Governance structure and strategic direction

The Ministry of Health, Labour and Welfare (MHLW) has played a central role in developing the health system in Japan. The MHLW actively coordinates and collaborates with various institutions, including the Cabinet Office, several government ministries, and specialised institutions. Traditionally, in consultation with the MHLW, the Ministry of Finance manages healthcare financing (particularly revisions pertaining to drug prices and health insurance fees); the Ministry of Education, Culture, Sports, Science and Technology supports education for healthcare professionals; and the Ministry of Agriculture, Forestry and Fisheries ensures food safety and, together with the Ministry of the Environment (MOE), supports the promotion of the One Health concept (see 8.6). Recently, the Cabinet Office and the Ministry of Economy, Trade and Industry have strengthened their involvement in healthcare. In 2013, the central government unveiled the Japan Revitalisation Strategy, in which healthcare was positioned as one of the most important driving forces in revitalising the Japanese economy [2]. In 2014, the Act to Promote Healthcare and Medical Strategy was passed, with the goal of shaping a society that promotes health and longevity. The Act promotes cutting-edge research and development (R&D) to achieve world-class standards of healthcare [3]. The Headquarters for the Advance Health And Medicine Strategy was established by the Cabinet Office to draft strategies to achieve this goal and to facilitate related strategies [3]. Furthermore, the Digital Agency was established to advance the development of a digital society in 2021 [4], and has enhanced cooperation among related ministries and agencies for the digitalisation of the healthcare field [4].

The MHLW established the position of Chief Medical and Global Health Officer in 2017 to lead and coordinate health policies by providing professional advice. The position supports (1) the country's health policy decisions and executes activities, such as integrating health technology in health policies; (2) oversees Japan's international relations in the field of health from a central position; and (3) considers appropriate responses to national crises such as the COVID-19 pandemic, with cooperation from the Cabinet Office [5].

Other stakeholders that have played a role in health policymaking include specialised professional organisations, such as the Japan Medical Association (JMA) and the Japanese Nursing Association. The JMA, an association representing physicians within Japan, also has substantial political influence. Industry associations and Japanese patient groups are also involved in health policymaking.

Japan's health system involves diverse organisations and complex stakeholders. Improving the system's governance sustainability and resilience is increasingly challenging, partly because of limited cross-sectoral coordination between and within the ministries responsible for policymaking and finance, and between local governments responsible for administering healthcare services and healthcare institutions, professional organisations, and businesses. The large proportion of private versus public hospitals is considered a major reason for this difficulty in coordination: in Japan, 81.6% of all hospitals were private hospitals, and in 2019 they comprised 71.3% of the total hospital beds [6]. These percentages are greater than those in the European Union in 2014, in which only 33.9% of hospital beds were in private hospitals [6].

Japan has approximately 1,700 municipalities spread across 47 prefectures. The central government is responsible for regulating and supervising the health system for all prefectures and municipalities. Prefectural governments propose Medical Care Plans (MCPs), and municipal (city) governments are responsible for administering healthcare services in the area. The central and local

(prefectural and municipal) governments have a legal obligation to maintain systems that efficiently provide high-quality healthcare services. Moreover, the central government sets nationally uniform fees for health insurance reimbursements; subsidises and supervises local governments, insurers, and healthcare institutions; and establishes and enforces detailed efficacy targets and action plans for insurers and healthcare institutions at the prefectural level [7].

Every prefectural and municipal government is responsible for providing healthcare and implementing public health services. From the late 2000s, Japan has pushed forward with restructuring its framework for providing healthcare services with a focus on local communities. Local governments are obligated to implement and evaluate health policies through the Plan-Do-Check-Act cycle to sustain and strengthen the health system on the basis of the revised MCPs (2006) and the Medical Cost Optimisation Plans (2008) [8, 9]. The 2006 strategy incorporated efforts to differentiate healthcare services and promote collaboration among healthcare institutions. With health needs increasing and becoming more diverse, communities are each facing different challenges. A greater need exists to provide healthcare services that match the realities of each community (e.g., community-specific needs, service resource conditions, human resources, and financial conditions), on the basis of the understanding and consensus among its residents. In the future, the healthcare delivery system must be strengthened according to a regional healthcare vision in which healthcare services are tailored to local needs, and appropriate healthcare resources are secured. Consequently, a Community-based Integrated Care System (CICS), which has been promoted by the Japanese central government since 2006, must be established. CICS refers to a system in which medical care, nursing care, care prevention, and support for housing and independent daily life are comprehensively ensured, so that older people can lead independent daily lives in the communities familiar to them [10].

Additionally, in 2000, the central government launched the National Health Promotion Movement (known as Health Japan 21), a new 13-year national health promotion policy (2000–2012), proposing the basic direction and goals regarding the promotion of the population health. The second term of Health Japan 21 runs from 2013 to 2023, and is marked by a greater focus on (1) extension of healthy life expectancy and reducing health inequalities, (2) prevention of the onset and development of lifestyle diseases, (3) improvement and maintenance of the required functions to sustain life in society, (4) maintenance of the social environment to support and protect health, and (5) improvement of lifestyles and social environments [11] (see 7.4). Prefectures and municipalities formulate their own health promotion plans in accordance with the second term of Health Japan 21, known as Prefectural Health Promotion Plans and Municipal Health Promotion Plans, respectively.

2.2 Public health

In accordance with the Health Care Reform Act passed in June 2006, every prefectural government in Japan is obligated to formulate an MCP according to the regional context to provide effective and high-quality healthcare [12]. MCPs aim to provide seamless healthcare services for residents by promoting collaboration and differentiation of healthcare institutions and integrating essential healthcare, including acute and chronic hospital care and home healthcare. Every prefectural government performs an annual review of hospital functions to remain compliant with the regulated standards. The MCPs focus on the following [8]:

- Strengthening countermeasures for five diseases (cancer, stroke, acute cardiac infarction, diabetes mellitus, and mental disorders) and five services (emergency care, disaster countermeasures, remote care, perinatal care, and paediatric care)
- Employing an adequate number of healthcare professionals
- Maintaining patient safety
- Implementing zoning of secondary and tertiary healthcare areas within prefectures, and calculating the required number of hospital beds for each secondary healthcare area

In Japan, all healthcare services are provided in accordance with MCPs. Whereas prefectural governments are authorised to formulate these plans, they are discussed in committees composed of representatives from JMA, the Japan Dental Association, and hospital stakeholders. Under the supervision of the MHLW, municipal governments perform the following health promotion activities for the public, according to the MCP frameworks created by the prefectural governments (activity details differ slightly by municipality):

- **Health guidance and check-ups for children in various stages of growth**. Each municipality provides guidance and offers consultations on topics such as childcare and prevention of diseases, by dispatching public health nurses to each household. These visitation services are free of charge and are provided upon parental request or referral by a physician.
- **Health check-ups targeting infants,** performed at public health centres (often implemented for infants 3–4, 8–10, and 18 months of age) [13]. Children 3 years of age are assessed in terms of growth; nutritional state; physical and dental health; behaviour, speech and mental development; eyesight; and hearing [13].
- **Vaccination of children**. Municipal governments provide most vaccines free of charge at public health centres and municipality health centres to protect children against preventable diseases, including tuberculosis, tetanus, diphtheria, pertussis, hepatitis B, *Haemophilus influenzae* type B, measles, rubella, polio, *Streptococcus pneumoniae* bacteria, chickenpox, and Japanese encephalitis [14].
- **Specific health check-ups targeting residents 40–74 years of age** participating in the national health insurance system and those at least 75 years of age participating in the later-stage elderly health system are provided free of charge, except for re-examinations or more detailed examinations after health check-ups [15]. Specific health guidance targeting residents who have received health check-ups and are at risk of lifestyle-related diseases, as well as cancer screenings are also provided free of charge [15] (see 7.5 for more information about specific health check-ups and guidance, and 3.2 for participants in the national health insurance). In general, residents eligible for cancer screenings include women 20 years of age or older for cervical cancer, women 40 years of age or older for breast cancer, men and women 40 years of age or older for colon and lung cancer, and men and women 50 years of age or older for gastric cancer [15]. Individuals 40 years of age or older are eligible for stomach X-ray examinations using barium [15]. Screening strategies, such as screening targets for cancer types, screening cost and eligibility, and methods for encouraging screening, differ slightly by municipality [15].

Specific health check-ups are conducted annually at designated community centres and medical institutions. A health check-up notification is mailed to each household, according to the city's household registry. The health check-ups consist of a physical examination, blood testing, and a self-reported medical treatment history and lifestyle survey. The proportion of citizens who received specific health check-ups was 55.6% in the 2019 fiscal year. This number could be improved [16]. The proportion was particularly low among dependents [16]. Furthermore, among those who received specific health check-ups, individuals targeted for specific health guidance because of a high risk of lifestyle disease was 17.4%, of which only 23.2% complied with the health guidance provided [16]. According to a large-scale study using the National Database of Health Insurance Claims and Specific Health Checkups of Japan (NDB) developed by the MHLW (see 5.5), the risks of metabolic syndrome, obesity, and cardiovascular disease are likely to be reduced in the long-term with specific health guidance [17]. Of the approximately 20 million people in Japan who underwent specific health check-ups in 2008, the authors selected those who received the specific health check-ups in 2011, were not taking antihypertensive medication, dyslipidaemia medication, or diabetes medication at the 2008 check-up, and did not meet the criteria for diabetes, thus resulting in a total of 1,019,688 participants eligible for health guidance. A comparison of the group that received health guidance (111,779 participants) and the group that did not receive health guidance (907,909 participants) revealed that a higher proportion of the former group had a ≥5% reduction in their obesity profile in 2011: waist circumference, 21.4% vs. 16.1%; high body mass index (BMI),

17.6% vs 13.6%; p<0.001, respectively). Those who received health guidance also had a higher rate of reversal of metabolic syndrome (adjusted odds ratio 1.31, 95% confidence interval: 1.29–1.33, p<0.001). However, the authors have indicated an important bias in that individuals who were motivated to comply with the specific health guidance tended to place a high priority on general health and to understand its importance [17].

The central government has implemented an insurer effort support system that incentivises the improvement of the utilisation rate of specific health check-ups [18]. Health insurers should identify segments of the population with low consultation utilisation rates, such as insured dependents, and encourage them to undergo health check-ups and obtain guidance. Subsidies are distributed as an incentive to insurers that actively implement such efforts. Additionally, a need exists to increase awareness of health and disease prevention among the Japanese public. For effective awareness, the effects of Japanese healthcare planning, including specific health check-ups and guidance, should be evaluated through multi-perspective analytics. Moreover, studies using large-scale health databases, such as the NDB, and their results should be disseminated to residents.

2.3 Social care

Japanese society is ageing. The population of individuals 65 years of age or older has increased over the past 10 years; it comprised 29.1% of the population in 2021 and has been estimated to reach 35.3% by 2040 [19]. Furthermore, additional social changes such as urbanisation and an increase in unmarried individuals, single-person households, and parent-child separated households, have led to an increase in the number of older adults living alone [20]. With the rapid ageing of the population in Japan, the central government established the Long-term Care Insurance (LTCI) system in 2000 to ensure sustainable access to the high-quality healthcare and welfare services necessary to realise a society in which older adults can maintain their dignity and continue to live where they prefer [21]. Residents 40 years of age or older must join this system, and if they are certified as requiring long-term care or support, they can receive long-term care services at a low co-insurance rate [21] (see 3.5). Additionally, since 2006, the central government has been promoting the CICS [10]. This system aims to provide suitable living arrangements within local communities, with appropriate social care and services to support daily living by integrating preventive, medical, and nursing care services by 2025, when Japan's older adult population is expected to peak [22]. The ideal size of each community is defined as providing access to services within a 30-minute travel distance [22]. The CICS uses funds from the LTCI system and is managed by municipal governments [23]. Challenges include insufficient coordination between social care and healthcare providers, a lack of clarity regarding the allocation of responsibilities, and the LTCI system's high dependency on contributions from families of older adults. As birth rates decline, and the average age increases, older adults will experience difficulties in continuing to live on their own, because of the shortage of healthcare resources to take care of them. Additional solutions, such as moving older adults to community care institutions, with the implementation of nursing or care robots and utilisation of foreign workers, will need to be considered.

Japan's welfare policies address multiple social issues in addition to the ageing population and declining birth rate challenges, including caring for people with disabilities, childhood poverty, social isolation or loneliness, and suicide.

- As a strategy for caring for people with disabilities, the central government is implementing a comprehensive welfare law addressing areas such as (1) fairness and equality with respect to people without disabilities, (2) reducing disparities, (3) solving pertinent social issues, and (4) support tailored to individual needs [24]. According to this law, the central and local governments provide financial support, migration assistance (to reduce social hospitalisation), local lifestyle infrastructure, and advice to people with disabilities [24].
- As a countermeasure against rising childhood poverty, the central government passed the Act on the Promotion of Policy on Poverty among Children in 2014 [25]. This Act aims to ensure that

children's future is not determined by the environment into which they are born, by improving the environment so that children in poverty can grow up healthy and by providing equal education opportunities (e.g., free health check-ups for infants and preschool children, free preschool education and childcare for households with low socio-economic status, and the assignment of school social workers and school counsellors as specialised staff in schools) [25].

- Regarding social isolation, several challenges have been identified, including declining support from local residents and governmental agencies' difficulty in identifying people in need of assistance [26]. Therefore, the central government is promoting various consolidated attempts by local governments to prevent death because of the effects of social isolation [26]. These initiatives include (1) consolidating information regarding people in need and enhancing coordination among relevant parties who provide support services, (2) promoting an understanding that privacy protection can be waived in coordinating preventive actions with private businesses, (3) prioritising the adoption of related subsidies and introducing preventive measures such as local patrols, and (4) coordination between municipalities and businesses such as housing providers [26].
- As a countermeasure against suicide and suicide attempts, the central government passed the Basic Act on Suicide Prevention and General Principles of Suicide Prevention to decrease factors that discourage living and increase factors that encourage it [27, 28]. Japan aims to realise a society in which people are healthy and have a reason to live, with reduced risk of suicide through inclusive support and enhanced coordination among organisations implementing related measures [27, 28].

2.4 Accountability

Incorporating feedback from stakeholders and providing convincing arguments to the public in Japan are critical for shaping and promoting healthcare initiatives, including policy proposals, policy decision-making, policy execution and promotion, and policy evaluation. Although much of the information from each council administered by the MHLW is purposefully made available to the public, the information is not always comprehensive or presented in a form that is easily understandable by the public. Additionally, the central and local governments do not always hold themselves sufficiently accountable in evaluating policy, owing to a lack of clarity regarding the level of explanation that central and local governments must provide when evaluating policy. Therefore, large amounts of information, in terms of both size and frequency, are disseminated to the public, who are given only the results, without an explanation of their meaning. Consequently, misunderstandings and inaccurate portrayals of multiple situations result [29].

Japan's policy proposals are developed and implemented by the central and local governments, which consider the opinions of a group of experts. However, compared with the West, Japan's policy decision-making remains underdeveloped in terms of the involvement of a wide range of stakeholders, including industry and the public. In the policymaking process, understanding the situation on the ground is important, and members with high professional competence should be included in the discussions to formulate effective policies and introduce them efficiently. However, even when stakeholders participate in policymaking processes, challenges in transparency exist. The process of stakeholder selection is rarely made public, and the process for incorporating stakeholder feedback into policy is opaque.

Furthermore, with the acceleration and progression of digitalisation, data utilisation is critical for thorough accountability and efficient and sustainable quality administration from policy proposal to policy evaluation. However, because of low data literacy and concerns regarding security and privacy, valuing data and using data effectively are not part of the culture in Japan. Thus, compared with other developed countries, Japan does not excel at data utilisation, such as the use of data for evidence-based policymaking (EBPM). Future challenges will include creating a standard nationwide approach to systematically propose and evaluate policies, building data infrastructure, and establishing a culture that encourages data utilisation (see 2.6).

2.5 Response to the COVID-19 pandemic

Compared with other developed countries, including Europe and the USA, Japan has had positive results in its response to the COVID-19 pandemic, as evidenced by the low mortality rate. As of June 2022, Japan's COVID-19 mortality rate was 246 per million people, the lowest among the 38 members of the Organisation for Economic Co-operation and Development (OECD) [30]. However, the positive results are not clearly due to a superior health system, political response, or government; instead, multiple factors might potentially have affected the infection and mortality rates. These factors include not only genetic and social factors, but also socio-cultural factors, residents' trust in public health guidelines and in the government, and health risk factors such as lifestyle-related diseases, obesity, and smoking, which are also risk factors for COVID-19 severity [31]. Many challenges that became prominent during Japan's response to the COVID-19 pandemic remain, thus suggesting that substantial room exists for improvement of the resilience of Japan's health system governance.

In response to the increasing number of pandemic-related crises worldwide, the central government of Japan established the Act on Special Measures Against Novel Influenza, etc. in 2012, governing Japan's response to new strains of influenza and other highly infectious diseases [32]. The central and local governments have independently formulated emergency response plans for infectious diseases such as new influenza strains, stipulating preparedness and action plans for emergencies [32]. In these plans, guidelines, implementation roles, and responsibilities are established per eventuality. For example, plans include (1) the protection of livelihoods and the economy; (2) the provision of healthcare; (3) prevention and containment; (4) surveillance; (5) collecting, providing, and sharing information and data; (6) coordination among relevant ministries, local governments, public health experts, and other relevant stakeholders. In responding to pandemics, the central government requests local governments to implement essential countermeasures that conform to local conditions. These countermeasures include establishing response headquarters at the prefectural level and formulating specific action plans. Furthermore, the cooperation of relevant organisations and individuals is requested to prevent the collapse of social and economic functions and to minimise health costs. For example, healthcare professionals and institutions, social welfare facilities, public transportation providers, mass media, and businesses, are encouraged to cooperate.

Coordination among levels of government is crucial to ensuring a coherent response to crises. However, the Act on Special Measures Against Novel Influenza, etc., stipulates that the central government can only guide local governments; in contrast, the local governments must unify to take action in the field. Moreover, the authority of the central government is limited to overall coordination, and it can give direct instructions to local governments only when the general coordination has insufficient effects, thus making the chain of command ambiguous. Therefore, discrepancies between the responses of the local governments and the original guidance provided by the central government have been encountered in the COVID-19 pandemic. In some instances, the public was confused by uncoordinated information sharing regarding the pandemic situation, and the announcement of states of emergency by the central and local governments.

In addition to the different messages from the central and local governments, accountability regarding COVID-19 pandemic responses has attracted criticism from the public. The central government made policy decisions on the basis of consultations with an expert subcommittee that had been convened. However, confrontations occurred between the expert subcommittee and the Prime Minister's Office, thus resulting in an increase in the number of policymaking meetings held by the central government, as well as several appointments with many Ministers of State for Special Missions. Therefore, the scope of each responsibility and how these structures make decisions had become unintelligible to the public.

Regarding the infrastructure capacity of healthcare institutions and public health organisations, provision of the necessary response beyond the existing infrastructure with flexibility and speed in response to the crisis was not possible, thus indicating the weak resilience of Japan's health system

governance. Furthermore, insufficient hospital beds had been made available for patients with infectious diseases, because of either a lack or an insufficient number of healthcare institutions designated to receive patients with infectious diseases, or a lack of incentives, such as financial aid, for the healthcare institutions to treat infected patients. The allocation of roles and responsibilities to healthcare institutions was also not effectively defined, thus causing challenges such as ambulance shortages that resulted in the death of patients. The public health centres responsible for maintaining local public health contributed to the prevention of the spread of infections by implementing infection screening, contact tracing, and isolation of infected patients according to designated action plans. However, in some cases, polymerase chain reaction (PCR) testing and tracing of close contacts were inadequate, and information regarding infections was not shared in a timely manner. These shortcomings occurred because of a shortage of workers during the COVID-19 pandemic peak, owing to insufficient measures for additional deployment of workers. To prevent the collapse of public healthcare services under these circumstances, the government announced multiple long-term, national states of emergency to suppress the pandemic, thus restricting the social and economic activities of residents. The framework in which healthcare institutions were not legally obligated to accept patients with COVID-19 also contributed to the strain on the health system. Additional measures will be required to address the newly identified challenges that emerged during the COVID-19 pandemic response, including an inability to promptly develop a health system that can manage a pandemic.

The action plan based on the Act on Special Measures Against Novel Influenza, etc. has contributed to preventing the spread of infections during the COVID-19 pandemic, but the responses were inadequate. The evaluation of emergency responses to the COVID-19 pandemic and revisions to action plans have yet to be conducted. However, the crisis management system clearly must be improved, including enhancing and maintaining laws and mandating relevant organisations, to identify health crises, such as pandemics, as national threats. First, the chain and method of command for responses to national emergencies must be improved. To do so, the roles of the central and local governments must be agreed upon, and consideration should be made in setting conditions in which stronger authority could be given to the central government during emergencies. Furthermore, the concept of public health (science) organisations should be revisited to ensure that policymaking decisions are based on scientific evidence during national health crises.

Japan has organisations, such as the National Institute of Infectious Diseases and the National Institute of Public Health, that focus on scientific research on infections and epidemiology for policymaking decisions. However, these organisations have insufficient capacity to support the frontline and coordinate emergency activities [33]. Additionally, their ability to disseminate information and provide risk communication intended for the general public, in both emergency and non-emergency situations, is limited [33]. A science and technology institute will probably need to be established to take the lead in formulating countermeasures through shock simulations that forecast potential external shocks (pandemics, natural disasters, etc.) and other means during non-emergency periods, for use during health crises. During periods of emergency, this institution might act as a command centre for public health; disseminate information and policies based on scientific evidence to the public; provide scientific advice to the central government for coordinating health R&D activities with organisations; and set policies to be implemented by central and local governments. Enhancing the coordination between the central and local governments to support responses to crises by centralising existing national organisations, such as the National Institute of Infectious Diseases, developing a network of local health centres and health research institutions, and supporting local government budgets could lead to better policy execution.

In October 2020, as part of its proposal for improving pandemic governance, the ruling party described the creation of a health security agency, a technical and research organisation responding to emerging infectious diseases (including COVID-19 and influenza) as well as AMR, and including healthcare services [34]. On 17 June 2022, the Japanese government announced the establishment of a Cabinet Office infectious disease crisis management agency in the Cabinet Secretariat, whose aim is to strengthen the functions of planning and general coordination in preparation for infectious

disease crises, including the current COVID-19 pandemic. In addition, on the same date, the government decided to establish of a Japanese version of the United States Centers for Disease Control and Prevention (Japan CDC), which will serve as a foundation and centre of scientific knowledge on infectious diseases. The aim is to unify infectious disease countermeasures, including research on infectious diseases and the dissemination of scientific knowledge, which have been conducted separately to date [35].

2.6 Two cultural shifts to enhance governance

To enhance the sustainability and resilience of Japan's health system governance, two cultural shifts will be focused upon: (1) overcoming bureaucratic mindsets and (2) establishing a culture in government that places more focus on the importance of data.

The complexity of the health system is at the core of the weakness of the chain of command in the Japanese health system. Local governments, private healthcare institutions, and healthcare businesses are accountable for healthcare delivery, whereas the central government controls financial aspects of the system. This complexity hinders the central government's ability to enforce health policies. Although the central government mobilises funding for local healthcare-related policy implementation, the responsibility for policy implementation is assigned wholly to the local governments, which lacks strict management controls. Therefore, establishing equitable healthcare across the country is challenging, because each local government independently maintains a healthcare service system. Furthermore, private healthcare providers are often financially constrained. Therefore, they may face difficulties in providing emergency medical care, nursing care, and welfare services to residents during crises. These aspects are likely to lead to inequality in health access for residents across the nation.

Multiple ministries are involved in the development of policies related to social security, thus suggesting that smooth coordination between ministries is also important. The country is bridging the gap between ministries and enhancing governance by local governments, but bureaucratic correctness and an aversion to structural change have delayed progress in overcoming these challenges. The current inflexible career system for public servants leads to negative attitudes towards organisational reform that transcend the boundaries of current responsibilities. Therefore, civil servants prefer measures that are limited to a specific ministry or agency. Furthermore, this framework creates pressure to avoid mistakes and is connected to an underlying culture of avoiding conflict and changing opinions. Recently, new regulations to revise laws every five years after their passage have allowed for a new trial-and-error mindset that permits organisational reforms to occur more readily. The responsibilities of a powerful central command centre should include strengthening cross-disciplinary coordination between and within ministries and collaboration with specialised institutions, to streamline the policymaking process and implement prompt and appropriate policy decisions. Moreover, this centre would need to display leadership, introduce external opinions to the government, reform public service, and overcome the barriers among sectors to provide stable healthcare service to residents.

Furthermore, EBPM that uses data will be crucial for the central government to gain the trust of stakeholders. The use of health data for policymaking in Japan is considered inferior to that of other nations such as the USA and the United Kingdom (UK) (see 5.5). Therefore, the development of a culture that promotes the value and public use of data is imperative. Data utilisation includes activities such as the identification of data for responses to policy challenges; data use for decision-making; data-driven revision of operations (e.g., eliminating paper-based work); and additional data creation and provision.

The MHLW and related ministries should publish data that are essential for policymaking decisions and evaluation, and independent scientists should evaluate the data scientifically, by using objective indicators. The results of their analysis should be returned to the MHLW to revise existing policies and formulate new policies. This process of policy proposal and evaluation should be repeated

continually in short cycles. Therefore, the healthcare information systems in the MHLW must be integrated into a single system with the help of statistical departments, and governance within the MHLW should be strengthened to promote this system's integration. External communities, such as academia, must be included in discussions of what to evaluate and how to effectively use the collected data for policies. For example, the ministries publish statistical data on the unified governmental portal site (e-Stat). However, raw and anonymous survey data are usually processed, aggregated, and presented for specific attributes, whereby the aggregation units are mostly not amenable to scientific verification analysis. Consequently, data published by the ministries are largely unsuitable for academic, secondary research. The publication of raw and anonymous survey data or a configurable system that allows users to set aggregation units, as required by the professionals who will use the results, is needed. In addition to cross-sectional studies, the central government should promote evaluation against hard endpoints by using panel investigations, a method to track data on individuals and groups over time. Not all variables must be quantitatively or objectively evaluated for policy promotion, because quantitative evaluation may require time or otherwise hinder policy progress. Bureaucratic motivation should be improved through implementation of the recommended measures and development of a culture among the MHLW and other relevant ministries to propose, execute, and evaluate policies based on appropriate evidence.

Promotion of data utilisation by publishing health data is crucial for EBPM. After the data infrastructure to share all national health records associated with every individual is established (see 5.5), the system should be implemented in a manner allowing access to analysable data for relevant stakeholders. To do so, development and maintenance of data infrastructure designed to publicly share data will be necessary. For the development of a nationwide data infrastructure, data must importantly be (1) shared with the understanding that the data belong to the relevant individual and (2) used for purposes to which the individual agrees. This framework will be possible after legislation is established that requires the protection of personal information and that individuals, healthcare workers, or relevant businesses requesting the use of such data ensure the protection of personal information. After collection through an opt-in method, the data must be anonymised, the formats must be unified, and the data must be cleansed, to facilitate rapid analysis. Electronic medical records (EMRs) should be universal to expand data quantities, and standardisation of EMR formats will be necessary to optimise data consolidation. For these efforts, coordination between MHLW and the Ministry of Economy, Trade and Industry is needed. Finally, data mirroring in a privately owned cloud to improve convenience for users should be considered.

On 7 June 2022, the Japanese government decided to establish a Medical DX Promotion Headquarters (tentative name) headed by the Prime Minister, and designated three priority areas: (1) the establishment of a nationwide platform for sharing and exchanging information on all aspects of healthcare (and nursing care), including immunisation, electronic prescriptions, specific health check-ups, and EMR; (2) standardisation of EMR systems; and (3) digitisation of the revision process of health insurance fees [36]. Digital transformation is expected to accelerate in these areas in the near future.

2.7 Recommendations

RECOMMENDATION 1A

Develop a strong data-driven culture, and make data the universal basis for policy decision-making

As EBPM progresses, an environment for data utilisation should be prepared across all components of the policy process. For example, to inform policy challenges, data-driven operations should be promoted, including clarification of data requirements; data collection, monitoring, decision-making, and verification must be without bias and must be data driven (i.e., evidence-based). Furthermore, decisions regarding the appropriate format and scope of secondary use for scientific verification, data creation, presentation, and publishing must be made in consultation with external communities including the public sector and academia.

RECOMMENDATION 1B

Create a bold and powerful national-level, data driven command centre that can promote governance to overcome bureaucratic mindsets

To effectively promote optimised changes based on the overall moderate-to-long-term vision for Japan's health system, organisational change in the central government under strong leadership should be promoted by placing a powerful national-level, data-driven command centre in a ministry such as the Digital Agency. The MHLW should take the lead in improving the efficiency of the policymaking process through effective coordination with specialised institutions and local governments across multiple disciplines, and between and within ministries, to make rapid and appropriate policy decisions and strengthen coordination with local governments. By overcoming barriers created between sectors, residents will be able to access a consistent healthcare service.

RECOMMENDATION 1C

Promote transparency in policy decision-making processes

The overall transparency of policymaking processes should be promoted by providing the public with access to the details of discussions and the processes of incorporating these discussions into policy, and selecting members of each council in the MHLW and other ministries. Regarding Japan's response to the COVID-19 pandemic, the government should evaluate how expert opinions have been incorporated in the decision-making process of policymaking.

RECOMMENDATION 1D

Organise and improve the chain of command for risk and crisis management

Guidelines regarding the responsibilities and chain of command of the central and local governments and coordination between them during emergencies should be reorganised through evaluation of the country's responses to the COVID-19 pandemic. To enable the minimisation of health risks for residents and the sustainability of socioeconomic activities, methods to remove obstacles for crisis response should be discussed and established in consultation with major stakeholders. Discussion topics should include proposals such as the potential for laws to provide central and local governments with more powers depending on conditions indicating the level of the crisis.

RECOMMENDATION 1E

Ensure Japan CDC's ability to respond to health crises such as infectious disease outbreaks

Japan CDC's function in executing science-based solutions to health hazards during periods of non-emergency and emergency should be ensured. For example, coordination between the government and the private sector in terms of R&D during emergencies should be strengthened while conducting shock simulations, promoting health crisis measures, disseminating public health evidence, and implementing risk communication intended for the general public, during both emergency and non-emergency situations. Japan CDC is also expected to provide scientifically informed policymaking advice.

RECOMMENDATION 1F

Promote health data use by developing a health data infrastructure and publicising data

The development and maintenance of data infrastructure should proceed on the basis of the assumption that data for policymaking and evaluation will be published and made available public. A law should be passed stipulating that health data are personal information, and individuals, healthcare professionals, and healthcare-related businesses can use the data, provided that the individual has agreed to such use with strict protection of personal information. Data should be anonymised, should follow a standardised format, and should be cleansed so that researchers can rapidly analyse data for research or policymaking purposes after data collection with an opt-in method (see Recommendation 4D).

3. DOMAIN 2
Financing

Japan's social security expenditure is increasing each year because of the rapid ageing of the population. However, the Japanese government has not been successful in securing financial resources equivalent to expenditure, and it continues to run a budget deficit, thereby threatening the financial sustainability of Japan's health system. The debt-to-gross domestic product (GDP) ratio in Japan is greater than that in other OECD countries, and the burden is being passed down to future generations. Currently, the rapid depreciation of the yen and upward pressure on prices have also increased the risk of higher debt costs. Restructuring the balance between benefits and burdens is critical to sustain the health system, and a national debate is needed. Domain 2 focuses on medical costs, which are particularly high in terms of both the total amount and the rate of growth. Possibilities for a financially sustainable public health insurance system, which will enable Japan to maintain high levels of health in a super-ageing society, are addressed.

3.1 Financing

A defining characteristic of the Japanese health system is that nearly all Japanese residents are enrolled in the health insurance system, which allows them to receive required healthcare with low out-of-pocket costs (OOP). The low patient contribution is offset by publicly sourced funds (insurance premiums and public expenditure). In 2018, 38.1% of healthcare costs were covered by public funds, and 49.4% were covered by insurance premiums; patient contributions accounted for only 11.8% of total healthcare costs [7]. The self-payment burden is light: OOP for healthcare accounted for only 2.6% of total household expenditure in 2017, a value 0.7% less than the OECD average of 3.3% [37]. However, health-related spending in Japan is increasing because of a rapidly ageing population, accompanied by longer life expectancies, changes in disease patterns, and an increasing demand for long-term care for patients with complex diseases. Advances in medical technology have also driven the growth in spending. According to data from the OECD, Japan's total health expenditure in 2019 accounted for 11.0% of its GDP – the 5th highest expenditure among the 38 OECD member nations, and 2.2 percentage points higher than the OECD average of 8.8% [38]. Japanese government statistics also show that the 28% increase (from JPY34.8 trillion to JPY44.4 trillion between the 2008 and 2019 financial years) [39] in total healthcare expenditure in recent years has far exceeded the stagnant economic growth rate. Japan's real GDP growth rate from the 2008 to the 2019 financial year was approximately 8% (from JPY508 trillion to JPY551 trillion) [40]. These data suggest that the sustainability of Japan's healthcare finances is in a difficult situation.

Amid the financial difficulties caused by a declining birth rate and ageing population, these demographic trends have created further intergenerational disparities in the burden and benefits of insurance premiums. Regional differences in population ageing and declining birth rates also create regional disparities in the burden and benefits of insurance premiums. To enhance the financial sustainability and fairness of Japan's healthcare system, reforming the balance between the burden and benefits of insurance premiums among generations and regions will be essential [41]. To ensure an appropriate balance, new financial resources must be secured while costs (benefits) are controlled, and efficiency is simultaneously improved. Three possible sources of funding exist: public expenditure, insurance premiums, and patient contributions. This chapter focuses on public expenditure. Patient contributions and OOP are analysed in sections 3.2 and 3.3, respectively.

The introduction of a new tax on goods and services with a high impact on health risks could be considered an alternative source of public funds (national treasury). When such a tax is introduced, its purpose (allocation of the increased revenue) should be clarified. For example, the World Health Organization (WHO) recommends a tax on sugar-sweetened beverages to increase government revenue and prevent lifestyle-related diseases [42]. Moreover, allocating a portion of tax revenue to improving the quality and access to treatment for patients who currently have related diseases is also important. In the case of tobacco taxes, for example, the tax revenues could be used to prevent smoking-related diseases such as chronic obstructive pulmonary disease and lung cancer, and to provide better access to treatment for already diagnosed patients. The UK and France have already introduced a sugar tax, and Japan could consider emulating their efforts. To decide on the

introduction of a new tax on specific items, careful consideration of the benefits and drawbacks would be needed, on the basis of detailed simulations taking various factors into account, such as the effects on people's consumption and the industry. Of note, consumption taxes are considered regressive because people in lower income brackets would bear heavier economic burdens.

3.2 Healthcare insurance providers

Japan has more than 3,000 insurers [7] and no single, unified insurance fund. Public health insurance in Japan includes two types of insurers: Employees' Health Insurance (EHI) and residence-based insurance schemes. Everyone who resides in Japan for 3 months or more must enrol in either of these public health insurance schemes, regardless of citizenship. Public servants and individuals who work for companies, along with their families, belong to the EHI scheme. In contrast, individuals who do not belong to the EHI scheme, such as self-employed or unemployed individuals, are covered under residence-based insurance schemes. EHI is divided into four categories: Japan Health Insurance Association, Society Managed Health Insurance, Mutual Aid Association, and Seamen's Insurance. Residence-based insurance schemes are categorised as either National Health Insurance (NHI), which is managed by municipalities, or an NHI Society, which is managed by groups of business owners working in the same industry. Furthermore, all Japanese citizens are enrolled in the Medical Care System for older adults after they reach 75 years of age [43].

Insurers have faced financial difficulties, and many have reported deficits (49.2% of municipalities and 36.2% of prefectures within the NHI scheme in the 2019 financial year) [44]. NHI is particularly financially vulnerable. Over the past few decades, the proportion of senior enrolees in the NHI has increased rapidly because of a surge in the population of older adults who have retired and terminated their relationships with their former employers [45]. The increase in lower-income older adult enrolees has amplified the downward pressures on the NHI fiscal balance (i.e., from growing expenditure and a declining funding base), particularly in smaller municipalities. The disparity in the proportion of income levied as premiums between plans has become increasingly problematic. Insurance premiums (rates) and their calculation methods are determined by insurers and thus vary among insurers. As of 2017, some municipalities have seen regional differences as high as 3.4 times in their insurance contributions within the NHI. The fragmentation of insurance plans has hindered the equalisation of insurance contributions [46]. The central government has acted to effect more sound financial management and solve disparities in premium rates. For example, it revised the NHI system in 2018, making changes including the transfer of certain financial management responsibilities from city to prefectural governments [47].

To financially assist insurers, the central government has also implemented cross-subsidy systems among insurance schemes and mechanisms, such as deficit coverage, by using special financial measures. Public subsidies to the NHI comprise 50% of the NHI's total budget; the National Treasury contributed 32% of these subsidies, and prefectural governments contributed another 9%. In addition to the public subsidies, an adjustment subsidy, which aims to elevate the financial capacity of local governments, is applied to 9% of the total NHI budget [48]. Furthermore, the central and prefectural governments are supporting municipal budgets by providing various subsidies, such as subsidies for the insurance contributions of impoverished families, for municipalities with large numbers of impoverished families, for adjusting differences in insurance contribution rates between municipalities, and for expensive medical procedures. To address the inequity between the EHI and NHI, the Medical Care System for older adults, aimed at assisting older adults (defined as 75 years of age or older), was also introduced in 2008 [43].

Disparities between insurers and the serious financial situation regarding the future sustainability of the public insurance system indicate that Japan may need to consider further consolidation of insurers. Previous efforts have included the transition of finances from cities to prefectures and the introduction of a late-stage medical care system for older adults. However, insurers in Japan remain

dispersed. Consolidation that encompasses both NHI and EHI would equalise the premium rates among insurers and expand total funding sources by raising the rates of some plans that are currently set at low levels, thereby stabilising the overall financial contribution [41].

3.3 Coverage

Japan has maintained a universal health insurance system since 1961. In principle, all Japanese residents are enrolled in some form of NHI through which they can receive healthcare benefits for disease or injury [49]. Japan's universal health insurance system is a pioneer in UHC, in which all individuals can access basic healthcare services at affordable costs. Japan is considered to have UHC because its insurance system is designed to ensure that neither the access to nor the quality of healthcare is restricted according to economic status. For example, health insurance premiums are set according to income level. The basic health co-insurance rate is 30% for people 6–69 years of age, 20% for people 70–74 years of age, or as low as 10% for people 75 years of age or older, who do not have the same income as the working-age population [50]. The high-cost medical expense benefit system subsidises healthcare costs that exceed the OOP thresholds. Additionally, people in the public assistance system who lack assets, support, or the ability to work can receive financial support to ensure a minimum standard of living and the same healthcare services as those covered by public insurance, free of charge. The free and low-cost health system enables people with low incomes or special circumstances preventing their access to healthcare to receive care free of charge or at a reduced cost.

One reason why Japan has achieved a high standard of health in a short period of time is the existence of a public insurance system that limits the financial burden on individuals. However, the system must be reviewed to reflect the current and future social environment in Japan. First, from the perspective of cost-sharing, intergenerational equity must be ensured, on the basis of the principle of affordability and to stabilise public finances. For example, in 2021, the law determining the health co-insurance rate for people 75 years of age and older was amended, increasing the rate from 10% to 20%, depending on annual income. The rate is 30% for people with incomes equivalent to those of working-age people. However, the current system does not account for people who have little income but many assets. In the future, the affordability principles must be further defined. For example, insurers might possibly identify financial assets such as savings accounts through the My Number system, which was introduced in 2015 to identify individuals for administrative purposes such as social security and taxation [51].

A review of the scope of health insurance benefits will also be required. At present, benefits cover a wide range of services including medical treatments, dental treatments, and pharmaceuticals, on the basis of the principle that essential and appropriate medical treatment should be covered. Exceptions include treatments with certain highly advanced medical technologies and cosmetic treatments [52]. Although the generous scope of benefits might be beneficial in terms of access to healthcare, finances do not necessarily benefit. According to one argument, society must have a strong social safety net in place, particularly for those facing major health costs, whereas those who can pay for their own treatment should be asked to do so. Determining what constitutes a minor risk is difficult, and experts have conflicting opinions. Nonetheless, services with low cost-effectiveness could be considered for exclusion from insurance coverage or increasing OOP to ensure fairness, such as vitamins with ingredients that are available at pharmacies without insurance. Simultaneously, a switch from prescription to over the counter (OTC) medication could be also promoted, while considering medical safety. However, in England, insurance benefit restrictions on OTC medicines have not been found to necessarily have substantial effects on insurance finances [53].

To embody the principle of UHC – namely, access and coverage for all people without exception – including socially vulnerable people, such as those with low socio-economic status and foreigners living in Japan, will become increasingly important. Income disparity and poverty have been growing and have been accelerated by the COVID-19 pandemic. Social security should be reviewed

periodically in light of the socio-economic situation. Those who have difficulty in accessing essential medical care should be rapidly identified and provided with financial support and information on the various support systems. Ensuring access to healthcare, including insurance coverage, for the ever-increasing number of foreign workers in Japan is challenging. For example, because of a lack of understanding of the Japanese legal system and inadequate employment management by some employers, some foreign workers are not covered by public insurance, despite having resided in Japan for more than 3 months and being eligible for coverage. Furthermore, some foreign workers are not officially included in Japan's Basic Resident Registration System for Foreign Residents, despite having worked in Japan for long periods. Measures should also be taken to identify these workers and ensure their access to health insurance after appropriate notification. Because language and culture are often barriers in the provision of healthcare to foreigners, provision of support resources, such as medical interpreters and social workers, may also need to be increased. Medical tourism also poses a challenge; excessive medical tourism could threaten UHC and patients' access to medicines in the public health insurance system. Therefore, medical tourism must be carefully supervised.

3.4 Payment system

Fees for healthcare services are set universally nationwide and reimbursed on the basis of the medical treatment performed in each healthcare institution [7]. Inpatient care at many acute care hospitals and some long-term care hospitals uses the Diagnosis Procedure Combination system, Japan's patient classification system for acute care hospitalisation, which is analogous to the Diagnosis Related Groups system developed in the United States. Other hospitals and all clinics are reimbursed solely on a fee-for-service basis. Fee-for-service payments may provide a perverse incentive for over-provision of medical treatment, polypharmacy, and prolonged hospitalisation, thus hindering provision of better medical care in a more economical manner [54]. Optimisation of healthcare costs is necessary. In this context, to ensure the financial sustainability of Japan's health system, momentum is growing toward focusing on patient outcome-based payment methods (value-based payment) [54]. Like other countries, Japan is moving toward evaluating medical technologies according to their value for patients rather than on the amount of resource input (see 5.2).

Although Japan has begun to introduce an outcome-based payment system for inpatient care, the scope of services and outcomes is limited. For example, in convalescent rehabilitation, the Functional Independence Measure is used to measure physical and cognitive (communication and social cognition) abilities, which are reflected as outcomes in the fee. Outcome-based payment can also be applied to other areas. Particularly for diseases such as hypertension, diabetes mellitus, and hyperlipidaemia, which have outcome measures commonly used in medical practices, using a system that adjusts fees according to the effects of treatment after several months may be considered. Leaving treatment choices up to individual healthcare professionals may lead to the innovation of better methods to achieve treatment effects. Nevertheless, metrics must be determined carefully for each treatment so that outcomes can be measured accurately and objectively. Creating a mechanism to prevent 'cream-skimming', that is, the exploitation of incentives by prioritising the treatment of easily curable patients, will also be important. Meanwhile, the need to prevent unfair discrimination against some people with respect to services that provide disease management, given that patient health and compliance are influenced by various SDH, is a cautionary point in using pay-for-performance.

Health technology assessment (HTA) was introduced in April 2019 in Japan. Currently, cost-effectiveness analysis, that is, the incremental cost-effectiveness ratio, is used in price adjustments of designated pharmaceuticals [55]. In Japan, compared with other countries, the use of HTA remains limited. HTA can be promoted in terms of both the expansion of the target items (e.g., not only pharmaceuticals but also procedures) and their applications (e.g., price adjustment of drugs listed for long-term treatment and clinical guidelines) (see 5.2). At present, the reimbursement price

(NHI price) is determined either by referencing prices of comparable drugs or using the cost calculation method for therapeutics when no similar approved products exist. The NHI price system does not precisely reflect the value of medicines and may threaten the financial sustainability of health systems. Review of the NHI pricing system overall should be performed continually and should include review of the outcome-based calculation method and how pricing is adjusted after launch. Prioritising target drugs and base measures on a positioning analysis of the top-selling drugs that have greater effects on costs may also be necessary.

Efforts are underway to promote and optimise drug prescription by considering cost. Optimal Clinical Use Guidelines are being introduced at the national level for several new innovative and expensive drugs, and some municipalities and providers have developed formularies. The guidelines stipulate patient eligibility conditions and requirements, from a scientific perspective, for healthcare institutions to use products. The guidelines are also used for assessing health insurance claims. These efforts should be strengthened in parallel with the promotion of the use of generic products to effectively restrain drug costs (see 5.3).

To improve the quality of healthcare services in regions and healthcare institutions, the overall performance (including the process [availability, equity of access, convenience, etc.] and structure [presence of appropriate, trained staff, the necessary equipment that is maintained, etc.] of healthcare services) should be evaluated and reflected in various incentives, such as fees for health insurance reimbursements. In particular, advanced healthcare institutions that provide advanced medical care should be evaluated further. A system that allows the public to evaluate healthcare institutions directly may also be considered (e.g., by reporting hospital performance data on clinical indicators). However, evaluation of the performance of healthcare institutions may negatively affect some healthcare institutions. Because opposition from healthcare providers is also expected, effective coordination among stakeholders will be required to realise such a system of evaluation: 6.3). Moreover, to promote outcome-based payment and performance evaluation, personal health information infrastructure that includes patient outcomes should be established (see 5.5).

3.5 Long-term care insurance

In Japan, where the population is ageing rapidly, long-term care expenditure is increasing every year. In 2020, this expenditure was JPY12.3 trillion and accounted for 9.7% of social security expenditure on a budgetary basis [56]. The central government enacted the LTCI system in 2000 [21]. The purpose of this system is to ensure access to high-quality healthcare services to realise a society in which older adults can maintain their dignity and continue to live where they prefer [21]. LTCI is financed by public funds (50%) and insurance premiums collected from residents (50%) [21]. Residents 40 years of age or older join the insurance scheme and pay the premiums, because they may need nursing care for themselves or their parents as a result of age-related diseases [21]. When a participant is certified as needing nursing care or support, nursing care services based on the care service plan are provided with a co-insurance rate of 10%–30% [21]. Long-term care services include physical care and daily living assistance at home and in a nursing care facility [21]. For those between 40 and 64 years of age, insurance benefits apply only if the condition requiring nursing care or support is certified to be due to a specific disease caused by ageing, such as cancer, rheumatoid arthritis, or Parkinson's disease [21].

Because of the increase in long-term care expenditure due to an ageing population, by 2020, insurance premiums paid by residents had increased to approximately twice the amount paid in 2000, when the system was launched [56]. Because long-term care expenditures are expected to increase in the future, financial resources must be secured. A social system that financially supports the nursing care of older adults should be created. Therefore, the following should be considered: lowering the age of residents who pay insurance premiums from the current 40 years of age or older to, for example, 20 years or older; increasing OOP (or co-payment) for a portion of services; or strengthening affordability by increasing the burden on high-income earners.

3.6 Financial governance

No policy advisory committee currently exists for sustainable social security, including medicines, medical, nursing care, and welfare services, in Japan. To promote reforms, a Social Security Advisory Board should be established to debate policy from a neutral position and contribute to political decision-making. Not only medical and political experts but also experts that represent patients' points of view should participate in the discussion. A system wherein the Social Security Advisory Board proposes effective policies to optimise financing with a secured budgetary limit would lead to policy formation that is more acceptable to the relevant stakeholders.

The establishment of a Social Security Advisory Board would provide an independent forum to facilitate objective policy evaluation and health data analysis. The establishment of such an institution could be beneficial, because the government's estimate of healthcare expenditure with respect to GDP is not consistent with the data from the private sector. Third-party bodies would make more precise and neutral estimates of healthcare expenditure (including the costs of drugs and medical equipment) as a percentage of GDP. Healthcare expenditure estimates should also include estimates of regional healthcare expenditure, because some regions, particularly in rural areas, may face growing healthcare costs that hinder effective healthcare service delivery.

3.7 Health system financing resilience

Natural disasters and pandemics are major threats to public health in terms of both the immediate crisis response and the long-term response. Therefore, all insurance companies must make provisions for the emergency health expenditures required to respond to urgent health threats such as outbreaks of infectious diseases. Such reserves should amount to 3 months' worth of average healthcare benefits and the provisions in the Act on Assurance of Medical Care for Elderly People over the preceding 2 business years, that is, a 1-month reserve for preventing the spread of influenza, and a 2-month reserve for delinquent payments [57]. Furthermore, the government provides emergency support to victims of natural disasters by implementing policies that exempt these individuals from paying healthcare costs.

3.7.1 Learning from the Great East Japan Earthquake response

The Great East Japan Earthquake and the resulting tsunami in 2011 caused catastrophic damages to healthcare institutions in regions affected by the disaster. However, many residents were able to continue receiving healthcare because of the effective provision of health information and healthcare services, as standardised under Japan's universal health system, and various tax exemptions, such as exemptions for the OOP for healthcare expenses. For example, in certain instances, the risks from chronic diseases were successfully mitigated, particularly for people with hypertension [58]. These experiences demonstrate that the Japanese health system has a resilient foundation and is capable of responding to public health emergencies.

3.7.2 Response to the COVID-19 pandemic

As part of its response to the COVID-19 pandemic, the Japanese government provided insurers with health subsidies for insurance contribution exemptions, extensions for insured individuals who saw their income decline during the pandemic, and injury and sickness allowances [59]. Simultaneously, the government rapidly implemented supplementary budget measures under the Emergency Comprehensive Support Grant for Novel Coronavirus Disease to sustain healthcare provision. The budget included subsidies for healthcare institutions, deployment of PCR testing, and treatment of COVID-19. To strengthen the financial resilience of Japan's health system, on the basis of the COVID-19 experience, Japan should formulate rules regarding emergency financing, including rules for issuing government bonds, how to redeem them, funding sources, and assessment of the risk of epidemics and pandemics.

3.8 Japan's role as a global health leader

Japan has been praised as a model for UHC in terms of its universal health insurance system and a low individual financial burden [60]. In contrast, moderate-to-low-income countries have yet to develop universal health insurance systems, and patients' OOP for healthcare are high. Furthermore, many countries have public health systems in place, but residents are unable to receive adequate healthcare because benefits are limited.

However, the financing sustainability of Japan's health system is under threat in the face of complex social changes, including increases in health expenditure, an ageing population, increasing average life expectancy, and declining birth rates [41]. However, these challenges are not limited to Japan, because the world's population is ageing at an unprecedented rate. As the older adult population increases, a shift in disease patterns from acute to chronic diseases, and from infectious to non-infectious diseases will occur [61]. Individuals will require long-term care for multiple diseases and disabilities, thus increasing burden on public spending. In the future, many countries will also need to respond to many diverse healthcare needs amid shrinking finances. However, if Japan, a leading example of a country with an ageing society with declining birth rates, can successfully restructure its future health system to maintain UHC, it may serve as a reference for other countries [60]. Consequently, Japan would have an opportunity to continue its role as a global health leader by promoting sustainable fiscal health reforms and optimisation, and to become a model for the global community.

3.9 Recommendations

RECOMMENDATION 2A

Secure public financial resources for the sustainability of the health insurance system

To ensure the sustainability of health insurance finances, stakeholders should discuss the appropriate balance between benefits and burdens. New taxes on goods and services that are confirmed health risks (e.g., tobacco, alcohol, and sugar) should be considered. If a new tax is introduced, the use of the tax revenue must be clearly defined (e.g., to be used for prevention of health-risk related behaviours and to treat associated diseases, etc.)

RECOMMENDATION 2B

Standardise insurance premiums (rates) and stabilise finances by promoting the integration of insurers

The central government of Japan should promote the consolidation of insurers to increase the size of each insurer, thereby stabilising the overall revenues and making premiums (rates) fairer. In this way, the disparities in premium rates across regions and occupations will be corrected, thus achieving equity, and the operational efficiency of insurers will be improved.

RECOMMENDATION 2C

Re-evaluate health co-insurance rates and coverage for health insurance reimbursements

Japanese society must have a strong social safety net in place, particularly for those facing major health costs, whereas those who can pay for their own treatment should be asked to do so. Healthcare services with low cost-effectiveness could be considered for exclusion from insurance coverage or increasing OOP to ensure fairness. For example, prescription drugs comparable to OTC medications could be excluded from the NHI benefits. Additionally, the central government should consider raising the health co-insurance rate to 20% or 30% for older adults who can bear the same burden as working-age people, given their financial assets.

RECOMMENDATION 2D

Promote and expand access to healthcare services for socially vulnerable populations

To avoid socially vulnerable people being unable to receive essential healthcare, as expected in a socio-economic distribution with a rapidly widening income gap, the system will need to be continually improved to be friendly to users regardless of socio-economic situation. For example, collaboration with other administrative systems, such as welfare services, would enable sharing of information regarding the necessary assistance. The central and local governments should also promote effective resident registration and public insurance coverage for the ever-increasing number of foreign workers, including those working without appropriate employment management. Simultaneously, support resources, including medical interpreters and social workers, should be supplied.

RECOMMENDATION 2E

Expand the outcome-based reimbursement payment systema

In moving toward the provision of better healthcare with lower costs, the government should accelerate the introduction of payment schemes based on patient outcomes rather than on the amount of resource input. Consequently, it should test, evaluate, and then implement an outcome-based payment system for diseases such as hypertension, diabetes mellitus, and hyperlipidaemia, which are common and have clinical measurements that are highly correlated with outcomes. Additionally, after establishment of a database that includes patient outcomes, a robust HTA system should be established, whose results should inform NHI pricing more promptly (see Recommendations 4A & 4D).

RECOMMENDATION 2F

Evaluate the performance of healthcare institutions according to evidence, and reflect on healthcare fees

The central government should expand and disseminate healthcare databases, and evaluate and publicise the healthcare performance of each medical institution or region according to evidence. Moreover, evidence-based reimbursement incentives should be strengthened to promote self-help efforts by healthcare institutions to increase cost-effectiveness and curb excessive services. (see Recommendation 4A).

RECOMMENDATION 2G

Establish a Social Security Advisory Board to provide unbiased and objective guidance on government healthcare finances

To objectively evaluate government finances and guide them in a sounder direction, an advisory function is needed to provide advice for social security from an objective and long-term perspective. Specifically, a Social Security Advisory Board should be established, comprising healthcare and political experts and patient representatives. Additionally, a new third-party organisation may be needed to analyse and publish estimates (e.g., healthcare costs relative to GDP) in a transparent and fair manner.

RECOMMENDATION 2H

Establish resources, including finance procurement and risk evaluation methods for new and emerging infectious diseases

On the basis of experiences during the COVID-19 pandemic as well as shock simulations, risks associated with new and emerging infectious diseases and other health threats, including climate change and AMR, should be forecast. Additionally, rules for emergency fundraising and resource procurement should be formulated on the basis of these forecasts (see Recommendation 1E).

4. DOMAIN 3
Workforce

The workforce environment in Japan will undergo immense changes in the next 20 years because of multiple factors, including a growing ageing population and a decreasing working population. Maintaining the nation's health and sustaining the health system will require a balanced distribution of healthcare (medical, nursing care, and welfare service) professionals; increased productivity through improvements in working environments; and realisation of positive health, wherein residents manage their own health. Therefore, the public should be included alongside medical, nursing care, and welfare service professionals in defining the 'healthcare workforce'.

For Domain 3, this report addresses the current situation and challenges in Japan regarding the number of healthcare professionals, sustainable modes of work, realisation of well-being, and the situation and challenges regarding changes in the workforce in response to the COVID-19 pandemic. Furthermore, to pursue positive health, details regarding the education of healthcare professionals who support health and healthcare management by residents are explained.

4.1 Workforce numbers

Japan had 8,300 hospitals, 102,616 clinics, and 68,500 dental clinics in 2019 [62]. The number of healthcare professionals in Japan has continued to increase over the past 10 years [63] and is approaching levels comparable to those in other OECD member nations. In 2018, the number of physicians per population in Japan was lower (2.5 physicians per 1,000 people), but the number of nurses per population was higher (11.8 nurses per 1,000 people) than the OECD average of 3.5 physicians and 9.0 nurses per 1,000 people (Table 3). To address the shortage of physicians, the government has been working to establish new medical schools and expand the number of medical school admissions since 2008 [22], and the number of students who graduated from medical schools in 2019 has increased by approximately 23% compared to 2008 numbers [64]. Although female physicians accounted for only 22% of physicians in 2018, this percentage has been increasing steadily [65].

For all types of hospital beds, including acute and rehabilitative care beds, and long-term care beds, the number of physicians and nurses per 100 hospital beds in Japan is 19 and 91, respectively (Table 3), numbers that are low compared to the OECD average of 96 physicians and 246 nurses per 100 hospital beds [66 – 68]. Of note these figures do not consider that the distribution of different bed types varies among countries. Japan must increase the number of medical professionals per hospital bed to improve the quality of medical care and prepare for emergencies such as pandemics, which require many human resources. Twenty percent of the Japanese workforce has been predicted to be involved in healthcare by 2040 [69], thus making efforts to increase the number of medical practitioners challenging. However, the number of medical professionals per hospital bed could be increased by reducing the number of beds. Of note, the number of beds per 1,000 people is higher in Japan, at 12.8, than the OECD countries' average of 4.4 in 2019 [66]; consequently, the use of hospital beds may be less efficient in Japan than in other OECD countries.

The salaries of physicians, dentists, nurses, and pharmacists were higher than the 2020 average annual wage for all workers, which was JPY4.33 million. However, caregivers' annual average salaries were JPY3.60 million, a value below this average (Table 3).

The healthcare industry saw a staff turnover rate of 14.2% in 2020 equal to the total turnover rate for all workers (Table 3). The turnover rate was calculated as the rate of workers leaving their jobs, for example by resigning through an intra-company transfer, to the total number of workers in the previous year. Although healthcare professionals, including caregivers, do not work under particularly poor conditions, a caregiver shortage because of the increasing ageing population in Japan is a concern. Improvements in working conditions and benefits will be necessary to recruit and retain caregivers.

Table 3: Key workforce data in Japan

Workforce number per population	Year	Per 1,000 people
Physicians	2018	2.5
Nurses	2018	2.5
Caregivers	2017	1.5
Workforce number per bed*		**Per 100 hospital beds**
Physicians	2018	19
Nurses	2018	91
Average wages		**Yen/year**
Physicians	2020	14,403,200
Nurses	2020	4,918,300
Dentists	2020	7,875,100
Pharmacists	2020	5,651,300
Caregivers	2020	3,600,400
National average for all workers	2020	4,330,000
Paid leave acquisition rates		**Average of paid leave days taken (%)**
Healthcare workers	2019	8.9 days (53.4%)
All workers	2019	10.1 days (56.3%)
Staff turnover rates		**Turnover number/total workers (%)**
Healthcare workers	2020	1,074,000/7,586,900 (14.2%)
All workers	2020	7,272,100/51,095,800 (14.2%)

Sources: workforce number per population [67, 68, 70]; workforce number per bed [66 – 68]; average wages (categorised by industry) [71]; average wages (all workers) [72]; staff turnover rates [73]; paid leave acquisition rates [45].

* Hospital beds include curative (or acute) care beds, rehabilitative care beds, long-term care beds, and other beds in hospitals.

On the basis of the 2019 revision of Japan's Labour Standards Act, all companies were required to allow workers, including managers and supervisors, granted 10 or more days of annual leave, to take five of those days of leave during a period chosen by their employer [74]. Japanese healthcare professionals' paid leave usage rate in 2019 was 53.4%, with an average of 8.9 days leave taken. These numbers are slightly lower than those for the average worker, whose paid leave usage rate was 56.3%, with an average of 10.1 days leave taken (Table 3).

4.2 Sustainability of the healthcare workforce

Japan's healthcare workforce demands are predicted to first rise and then fall. The MHLW has estimated that the supply and demand will reach an equilibrium around the year 2029 with approximately 360,000 physicians [75]. This demand is also predicted to increase in the next 5–10 years as individuals in their 50s and 60s, who are currently the largest age group in Japan, transition to an age requiring acute care, that is, 60–70 years of age. The demand will continue to increase until these individuals reach the age of 70 or older, when long-term care for chronic diseases will become necessary. Subsequently, however, the demand is expected to decline over the long term as the older population declines.

Assuming a balance in supply and demand of the healthcare workforce, challenges related to the physician workforce include workforce shortages due to the reduction of working hours to improve working conditions, and the uneven distribution of physicians across regions and clinical departments [76]. To increase productivity to compensate for the reduction of working hours, the skill mix for all healthcare professionals will be critical. The Japanese Nurse Practitioner (JNP) system was introduced to promote skill mix, by allowing nurses who have obtained advanced knowledge and skills at a designated institution and received certification for completion to perform some medical procedures usually performed by physicians. However, the JNP system has not yet become widespread because of opposition from the JMA. To prevent an uneven regional distribution of healthcare professionals, the distribution of physicians and/or healthcare specialists in clinical departments by region, and the balance between the number of healthcare specialists and generalists must be adjusted. To combat uneven regional and departmental distributions, the Japanese Medical Specialty Board has set a limit on the number of specialist physicians that can be employed per prefecture and clinical department, according to a new system for specialist physicians introduced in 2018 [77]. To resolve uneven regional distributions, prefectural plans are being formulated and promoted to recruit and retain physicians. In the future, the central government may need to set restrictions on medical professionals freely choosing their departments and to revise related regulations to ensure that human resources are evenly distributed among healthcare institutions with good working and living conditions. Moreover, developing healthcare generalists who can treat a variety of injuries and diseases will also be important. Of note, the percentage of physicians with specialist qualifications increased from 56.9% in 2014 to 62.0% in 2020 [78, 79].

Future estimates of the supply and demand for nurses suggest that although the supply of nurses will be nearly sufficient around the year 2025, shortages in urban centres and caregiving and home-visit nursing care will continue [80]. An increase in patients with chronic diseases requiring medical treatment and nursing care for long periods has been predicted to accompany the rapid ageing of Japan's population. Continued efforts will be required to transfer workers to caregiving and home-visit nursing care services, which have seen an increase in demand [80].

Furthermore, the working-age population is expected to decline sharply over the next 20 years, until 2040, and concerns have been raised that the number of nursing care assistants and caregivers, particularly, will be insufficient [69]. To improve the working conditions of healthcare workers, compensations must be made for the shortage of human resources caused by a reduction in working hours. Promoting the employment of workers from other countries and improving productivity through use of advanced technologies, such as artificial intelligence (AI) and information and communication technology (ICT), will be essential to provide continued appropriate healthcare services as workforce constraints increase. To ensure adequate human resources for nursing care, personnel should be appropriately allocated according to the level of nursing care needed. The allocation may be promoted by collaboration among nursing care professionals, residents, and companies. The current LTCI system ensures a wide range of services regardless of care and support levels, but a system may need to be created to allow care professionals to concentrate on patients requiring high levels of care and support, with citizens and the private sector taking charge of services for those who require low levels of care and support.

Events affecting the lives of healthcare workers and their diverse career paths must be considered. For example, the management of flexible workforce contracts, including part-time work and the reinstatement of accredited healthcare professionals, should be considered to enable certain needs to be met, such as the ability to study abroad and then return to the workforce. Accepting highly skilled healthcare workers from other countries should also be considered. Disparities in salaries, benefits, and the power dynamics among medical offices at public hospitals and private hospitals and clinics affect both the motivation and disposition of healthcare workers. These factors have the potential to hamper the provision of equal healthcare services. The salaries and benefit incentives for healthcare professionals employed at public hospitals and hospitals in rural areas may also require review.

Demand and supply planning for the healthcare workforce should account for several factors [81], including declining demand stemming from more efficient methods for providing healthcare services through the utilisation of digital technologies; increasing demand arising from changes in disease burden; a rising number of patients from other countries; and the increasing complexity of communication arising from broadening of patient needs. In addition, foreign labour and regional disparities in healthcare access, services, and human resources, as well as in the workforce's working and living conditions, are also important factors. Measures for rapid distribution and adjustment of the workforce, in addition to periodic revisions to workforce plans based on current local conditions and changes in the workforce environment that involve healthcare professionals, must crucially be implemented.

4.3 Workforce well-being

In Japan, long working hours and mental health are becoming substantial challenges for workers. Japan is well known for its long working hours. Despite a gradual decline in the average annual hours worked over the past 10 years, this figure reached 1,598 hours in 2020. Only several developed nations, including the USA (1,767 hours) and Canada (1,644 hours), have higher averages than Japan [82]. The Survey on State of Employees' Health in 2018 indicated that 58.0% of workers experience work-related stress [83]. Long working hours are associated with health hazards and even death. In 2019, 216 cases of brain and heart diseases, and 509 cases of mental health disorders in which overwork was recognised as the leading cause among all workers were reported in Japan [84]. Furthermore, 1,949 suicides were related to working conditions in 2019, accounting for 9.7% of the 20,169 suicides that occurred among all workers in Japan. [84].

Death and mental health disorders resulting from long working hours are also becoming a major problem among healthcare professionals. Healthcare professionals, particularly young physicians in their 20s and 30s, are required to communicate with patients around the clock and to work long hours far surpassing those of other workers. One survey has reported that 3.6% of physicians consider suicide or death on a weekly or daily basis [85]. The long working hours are driven by multiple factors, including responses to the rapid advancements in healthcare technologies, and an increasing need to provide better quality healthcare and attentive support to the patients.

When patient outcomes are insufficient, and patient dissatisfaction is high, healthcare professionals are often stressed. Therefore, caring for their mental health and providing training for facilitating communication between patients and healthcare professionals are important.

The central government introduced the Stress Check Program in 2015 to reduce workers' stress. Annual stress surveys are obligatory for workers at all workplaces with 50 or more workers, including healthcare institutions [86]. Individuals experiencing high levels of stress are strongly encouraged to visit occupational physicians [86]. Furthermore, the MHLW established a task team to discuss reform of working conditions for physicians in 2017. The task team has discussed proposals and policies to reduce the working hours of healthcare professionals. Proposals emphasise skill mix between physicians and other healthcare professionals, using healthcare

technologies effectively, optimising the regional distribution of healthcare resources, and promoting flexible working styles [85]. Plans are also underway to restrict the maximum overtime hours that physicians may work to 960 hours per year and 100 hours per month, starting in 2024 [85]. Expanding the mental and psychological support available to healthcare professionals in tandem with workstyle reforms will be important.

4.4 Promotion of positive health by healthcare workers

Activating healthcare workers, including medical, nursing care, and welfare service professionals, and the public will be important to achieving positive health and consequently enhancing the sustainability of the health system in Japan. Positive health, a concept proposed by Dr Machteld Huber, promotes active management and development of individual health and well-being, such that individuals independently respond to physical, mental, and social issues instead of passively receiving healthcare services from the system [87]. To achieve positive health, residents are encouraged to learn about health and medicine on their own, understand their own health, judge whether their health is good or bad, and according to these considerations, have more fruitful discussions with healthcare professionals. To learn about health, the public should also actively use the support provided by communities, workplaces, patient groups, and the media to acquire scientific information in an easy-to-understand manner. As residents acquire healthcare literacy, the competencies required by healthcare professionals will change. For example, network construction and implementation skills for multi-disciplinary collaboration, technology utilisation skills, and social skills (non-technical skills) such as patient communication, which have not previously been a focus, will be required. These skills and knowledge should be incorporated into basic training for healthcare professionals.

To achieve patient-centric healthcare, the information gap between the public and healthcare professionals should be eliminated by promoting IT education for both groups. Patients in Japan often take a passive approach to their own treatment. Healthcare practices that empower patients should be promoted. For example, patients should be encouraged to actively interact with healthcare professionals; set goals that best suit their way of life, philosophy, and social situation, including economic and work conditions; and participate in decision-making regarding preventive and therapeutic measures. These changes will improve satisfaction among both patients and healthcare professionals; ensure the medical safety of patients; and improve adherence and quality of healthcare.

Building a society in which all residents can easily access healthcare through collaboration among the public and healthcare professionals, the government, and businesses is important. For example, if companies actively encourage employees to take paid leave to use healthcare services, the number of night and holiday visits to healthcare institutions will decrease, thus facilitating shorter working hours for healthcare professionals and improving their working conditions. Such a framework could prevent the decline in productivity and medical accidents associated with the long working hours of healthcare workers, and ensure medical safety and ultimately the wellbeing of healthcare workers.

4.5 Workforce response to the COVID-19 pandemic

Each prefecture aims to maintain a healthcare provision system for infectious diseases, by formulating a prevention plan based on the Infectious Disease Act. Related efforts include establishing healthcare institutions designated for infectious diseases and maintaining systems for transferring patients with infectious diseases [88]. However, the COVID-19 pandemic has partially disrupted the healthcare delivery system in healthcare institutions designated for infectious diseases and general healthcare institutions, and hospital beds and healthcare staff, such as physicians and nurses, are in short supply. Japan has more advanced acute care and acute care

beds, and fewer patients with COVID-19, than other countries. However, Japan experienced a shortage of healthcare professionals in healthcare institutions that treated patients with COVID-19, whose treatment requires more healthcare professionals than the treatment of other infectious diseases. This shortage arose from the small number of healthcare professionals per hospital bed, and the unequal distribution of healthcare professionals among regions and clinical departments. Additionally, because the maintenance and operation of advanced acute care beds require substantial financial resources and hard work contributed by healthcare professionals, sufficient financial support is necessary, particularly during a pandemic. Moreover, whether the central and local governments' lack of authority over private hospitals might have hindered the flexible allocation of healthcare resources during the COVID-19 pandemic must be determined. Thus, structural problems regarding dispersed healthcare services and uneven allocation of healthcare resources were substantial during the emergency. Furthermore, operations were placed under increasing strain because of a lack of workers in public health centres that managed the health crisis in communities, partly because of a decrease in workers in public health centres. A nationwide reduction in the number of health centres from 850 in 1990 to 469 in 2020 occurred because of administrative reforms conducted in the 1990s [89]. With healthcare staff receiving insufficient training and an absence of existing safety protocols for infectious diseases or natural disasters, healthcare institutions were in disarray.

The central government funded bonuses to healthcare professionals who treated patients with COVID-19 to increase their motivation, because healthcare professionals were required to work hard for long periods of time because of a workforce shortage.

To produce a resilient health system by ensuring a sufficient number of healthcare professionals to meet the increased demand during the COVID-19 pandemic, the central government promoted skill mix, whereby laboratory technicians and paramedics administered vaccinations instead of medical professionals, and nurses who were not working were reemployed [90]. However, healthcare professionals, including nurses who were not working but were willing to work, were not reemployed quickly and efficiently during the COVID-19 pandemic. As of 2012, approximately 710,000 nurses were not working, accounting for approximately one-third of the 2.25 million qualified nurses 65 or younger [91]. The reasons for the large number of non-working nurses might have included life events such as marriage, pregnancy, childbirth, and childcare, as well as challenging work environments, including long working hours and night shift burdens [92]. Although the central government established a notification system in 2015, encouraging nurses to register their locations, the aim of improving the efficiency of reemploying nurses who were not working might not have been sufficiently achieved [93]. The healthcare professional registration and reemployment system must be strengthened to allocate human resources flexibly during emergencies.

In many instances, communication did not proceed smoothly during the COVID-19 pandemic; for example, the sudden dispatch of new staff prevented professionals from working well together. Communication between healthcare professionals and patients and their families rapidly deteriorated, thus increasing dissatisfaction among both parties.

Building on the lessons learned from the COVID-19 pandemic, to ensure a resilient health system during a health crisis, an emergency response protocol should be determined in addition to initiatives during non-emergency periods. Measures should include establishing designated healthcare institutions, registering healthcare professionals, educating specialised healthcare professionals, and drafting safety protocols at each level of central and local governments. Implementation of these measures would allow for rapid implementation of essential countermeasures during a pandemic or natural disaster.

4.6 Recommendations

RECOMMENDATION 3A

Secure healthcare workforce resources by expanding the hiring of foreign labour and using new technologies such as AI and ICT

Recruiting healthcare workers from other countries and decreasing labour-intensive work requirements, by using advanced technologies, such as AI and ICT, should be actively promoted. For example, technologies that enable information sharing by e-mails and management of the working status of healthcare professionals might be useful. These initiatives would help decrease the working hours of healthcare professionals by improving their working conditions and compensating for workforce shortages expected in the future because of a reduction in the working-age population.

RECOMMENDATION 3B

Streamline healthcare through the redistribution of healthcare professionals and skill mix

Through flexible revision of workforce enhancement plans, workforce flexibility should be encouraged through skill mix, multidisciplinary cooperation, redistribution of healthcare professionals across regions and clinical departments, and adjustment of the balance between the number of specialists and generalists. Furthermore, improvement, differentiation, and collaboration in Japan's healthcare services should be promoted by training general physicians to meet the increasing demand, and deploying more female and international physicians. Setting certain restrictions on the free choice of medical departments to which healthcare professionals are assigned to should also be considered. Furthermore, regulations should be reviewed to ensure that human resources are evenly distributed among healthcare institutions with good working and living conditions. Reimbursement incentives should also be strengthened to promote the use of the JNP system by healthcare institutions to encourage skill mix.

RECOMMENDATION 3C

Improve the well-being of healthcare workers

An environment where diverse healthcare professionals can work productively should be created by investing in improving work environments for healthcare professionals. Environments should provide easy access to psychological support, and help workers experience less stress and remain motivated. Flexible employment systems should also be established to meet diverse needs, such as to enable studying abroad.

RECOMMENDATION 3D

Promote patient-centric healthcare and educate healthcare professionals to support positive health

Residents should be encouraged to acquire knowledge regarding health and healthcare and to recognise their own health values. To facilitate learning, support from non-medical providers should be intensified. For example, health education in local communities, workplaces, and patient groups, and healthcare information provision for residents by non-profit organisations (NPOs) should be strengthened. Simultaneously, healthcare professionals should be encouraged to acquire not only health expertise but also networking skills for multidisciplinary collaboration, knowledge, and skills related to technology, as well as social skills, such as patient communication (non-technical skills). Through these efforts, the information gap between the public and healthcare professionals should be addressed. Additionally, patient-centric healthcare should be promoted, so that patients can set their own disease prevention and treatment goals and choose their own methods to achieve goals in consultation with healthcare professionals.

RECOMMENDATION 3E

Establish a healthcare provision plan for times when Japan is and is not experiencing health crises, to prepare for possible future pandemics and natural disasters

On the basis of experience gained during the COVID-19 pandemic as well as shock simulations, training plans, safety protocols, and emergency plans to allocate healthcare professionals to healthcare institutions should be formulated. Knowledge and experience gained from the pandemic should be codified and disseminated. Training of healthcare generalists and highly specialised professionals should occur during non-emergency periods, and systems should be put in place to enable rapid worker allocation in emergencies. A system for registering and reemploying healthcare professionals should be established, so that workers on leave can be reemployed without delay during a pandemic (see Recommendation 1E).

5. DOMAIN 4

Medicines and technology

In Domain 4, the approach to health technology in the Japanese health system is addressed, considering the approval, reimbursement, pricing, evaluation, and promotion of the optimal use of health technologies and their stable supply; the utilisation of digital health services such as remote consultations and EHRs; personal health records (PHRs) across medical, nursing care, and welfare services; and R&D. The acquisition of medical supplies and roll-out of vaccines and therapeutic drugs in response to the COVID-19 pandemic are also addressed.

5.1 Adoption of health technologies

In Japan, the Pharmaceuticals and Medical Devices Agency (PMDA) reviews and recommends the approval (if relevant) of new pharmaceuticals and medical devices on the basis of their quality, safety, and efficacy. When applicable, the PMDA recommends the approval of pharmaceuticals or medical devices to the Minister of the MHLW, who has final approval authority after consultation with the Pharmaceutical Affairs and Food Sanitation Council in the MHLW. The number of pharmaceutical and medical device approvals per year and the timeframe for approval in Japan are similar to those in the European Union and the USA. Because of the efforts of the PMDA, approval delays have been largely resolved. For example, in 2019, 130 items were approved in Japan with a median approval time of 9.9 months, compared with 116 items in the USA with a median approval time of 9.9 months, and 111 items in Europe with a median approval time of 11.9 months [94]. Nevertheless, many health technologies that have been approved in Europe and the USA remain unapproved in Japan. Therefore, delays in development by manufacturers remains a challenge. For example, although the introduction rate of medical devices, such as computed tomography and magnetic resonance imaging instruments, is high in Japan, supportive devices, such as diagnostic imaging AI devices, have not been widely deployed. Furthermore, because of various reimbursement price system reforms in recent years, downward pressure on drug prices is increasing. Because foreign manufacturers find the market unfavourable, owing to unpredictable prices in an uncertain system, they may become reluctant to introduce new drugs into the Japanese market, thus leading to a reoccurrence of drug delays.

The Japanese health insurance reimbursement prices for pharmaceuticals and medical devices are standardised across the country, and prices are set by the health insurance fee system. The reimbursement price is that at which payors reimburse healthcare institutions (including medical institutions and pharmacies) for healthcare services, such as pharmaceutical products prescribed to treat patients. For branded pharmaceutical products, the Central Medical Council, in consultation with the MHLW, determines the prices on the basis of comparison with existing similar approved products on the market. If no similar drug exists, a cost accounting system is used to determine prices. Once set, the price is adjusted according to the actual market price annually (before 2020, this adjustment was performed bi-annually). Other adjustments are also made in the system, including premiums for innovative products and price cuts for indication expansion and long-listed products (e.g., off-patent brand-name drugs after their first generic version is included on the NHI drug price list). Medical device payments are priced and reimbursed differently for each type of technology, either under insurance coverage as part of a technical fee for specific procedures or separately from technical fees, according to NHI reimbursement prices. Effective and safe health technologies that are approved by the PMDA are reimbursed in principle, with some exceptions, such as health technologies that are unsuitable for NHI reimbursement or new technologies requiring evaluation. Some of these health technologies are registered as advanced medicines.

The Japanese government promotes control over overall costs, particularly by reducing drug prices. In fact, NHI prices for pharmaceutical and medical material prices (weighted average of unit prices) have been negatively revised for more than 10 consecutive years. Although the control of NHI prices ensures the sustainability of health insurance finances, excessive reductions may impede innovation. Balancing healthcare finances and innovation is important.

5.2 Health technology assessment

Cost-effectiveness evaluation was introduced as part of the HTA in Japan in 2019 to control the prices of new drugs with large market sizes or high unit costs. Targeted drugs are evaluated on the basis of the incremental cost-effectiveness ratio calculated by assessing the economic efficiency and effectiveness of the drugs, and the results are used to determine reimbursement and pricing. Efficacy is evaluated on the basis of clinical trial data by using quality adjusted life years and calculated by adjustment of survival years with the quality of life (QOL) score. For economic efficiency, the cost of the drug itself and future healthcare costs without the use of the drug are estimated according to NDB data (see 5.5) and other data.

Challenges related to the HTA in Japan include that (1) the scope of the evaluation is limited to a small number of drugs, (2) the social value for patients is not considered, and (3) the evaluation is limited to benefit decisions and pricing of new drugs, and is not applied to post-launch drug price adjustments. In the future, the scope of the evaluation should be expanded to include many drugs, medical devices, and medical treatment protocols. Additionally, the general value for patients, including social factors such as well-being, should be reflected in the evaluation in addition to economic efficiency and effectiveness. Furthermore, the evaluation should be used for wider applications, such as drug price adjustment after launch and medical guideline developments (e.g., determination of drug recommendations for disease treatment). To achieve this framework, stakeholders first must establish objective evaluation indices and methods. Evaluating the outcomes of treatments that vary depending on the physician who executes the treatment, for example, surgical procedures, is particularly difficult. Real-world data and other sources should be developed collaboratively to generate suitable evidence of outcomes evaluation, and sources should be made available by many stakeholders, including third parties (see 5.5). These proposals necessitate training of health economics researchers capable of developing this new evaluation method, conducting evaluations, and establishing a strong management system.

5.3 Optimal use of health technologies

Optimal use of health technologies, particularly drugs, has been promoted in Japan because of the need to control healthcare costs. Since the 2010s, multiple stakeholders have strengthened their efforts to guide the appropriate use of drugs. To regulate expensive and innovative drugs, the Japanese government issued the Optimal Clinical Use Guidelines. The guidelines stipulate patient eligibility conditions and requirements for healthcare institutions to use products, from a scientific perspective. The guidelines are also used for assessing health insurance claims. At the regional and intuitional levels, a growing trend involves creating formularies that specify medications recommended for prescription on the basis of comprehensive evaluation of efficacy, safety, and economic efficiency.

The government also promotes the use of generic pharmaceuticals to reduce drug costs. In Japan, brand name pharmaceuticals received long-term market protection, and generic drugs have not often been used after patent expiration. The government set a target to increase the share by volume of generic products to 80% and is working to promote the use of generic pharmaceuticals [95]. Therefore, the share by volume of generic products increased from 62% in 2017, which was significantly lower than that in the USA (92%) and Germany (87%) [96], to 71% in 2021 [96]. However, in 2021, the share by value of generic pharmaceuticals (i.e., the turnover of pharmaceutical companies) was only 41% [96]. Increasing the share by value by promoting the substitution of expensive brand name pharmaceuticals (e.g., biologics) with generics will be important.

5.4 Stable supply of health technologies

To ensure the sustainability of the health system, calls for a review of the pharmaceuticals supply chain structure in Japan are growing. The structure has become more vulnerable to risks as drug manufacturers have consolidated manufacturing sites outside Japan, for example in China and India, to lower their manufacturing costs, partially in response to the NHI drug price cuts. Domestic distribution in some manufacturing countries and plants is easily affected by supply challenges, such as pandemics and natural disasters. Additionally, because of the promotion of the use of generic drugs, generic drug manufacturers' quality control systems and human resources have been unable to keep up with the escalating demand. In one example, a top generic manufacturer shipped products that did not meet the standards and was subjected to administrative penalties [97].

A trade-off exists between medical economy (reduction of drug prices) and stable supply, and maintaining an appropriate balance between them is important for resilience. A stable supply of essential pharmaceuticals should be ensured by provision of financial support for domestic manufacturing, decentralising the global supply chain, and providing necessary allowances in NHI prices.

5.5 Digital health

The digitisation of Japan's health system lags behind that in other countries. The health system faces many digitisation challenges, including (1) the low rate of use of EMRs, (2) the lack of progress in establishing a nationwide PHR system and in data utilisation, (3) the low implementation rate of online consultations, and the (4) slow development of digital devices such as Software as a Medical Device, that support diagnosis and treatment.

The introduction of EMRs has progressed in large hospitals. As of 2017, EMRs have been introduced in 85% of general hospitals with 400 or more beds (excluding those with only beds for treatment of mental disorders or tuberculosis) [98]. However, the EMR adoption rate in the primary care system is low by international standards [99, 100]. In Japan, the EMR adoption rate in primary care in 2021 was 42%, which was below the OECD member average of 93% [99, 100]. Many older physicians with low digital literacy who prefer to continue using paper medical records, and the high cost of introducing and maintaining EMRs may be contributing to lower EMR adoption rates in the primary care system. To promote the use of EMRs, reducing the cost or strengthening incentives for its implementation and maintenance (including subsidy support) and providing digital education to ageing healthcare professionals are important.

Data integrity across healthcare institutions is lacking. Although EMRs are shared within some regions or prefectures by using community health information networks, nationwide information sharing has not progressed. Therefore, fragmentation of patient information, with inefficient patient information sharing among healthcare institutions, has occurred in some areas. This fragmentation of patient information leads to inefficient healthcare service provision, such as over-testing (e.g., retesting at the referring hospital), over-treatment, duplicate medication and polypharmacy, and frequent and duplicate visits. Additionally, healthcare professionals cannot quickly and accurately provide emergency treatment based on a patient history of disease and treatment. The lack of unified standards due to the large array of EMR vendors may hinder information sharing of EMRs. However, the COVID-19 pandemic, which has highlighted the need for online medical treatment and rapid and accurate information sharing during health crises, has enabled a common understanding of the importance of data integrity and developing data infrastructure. The central government, in collaboration with the private sector, should create a system that enables the nationwide sharing of patient information by promoting the standardisation of EMRs.

The MHLW manages the NDB, which contains the health insurance claims, referred to as receipt data (receipts issued by healthcare service providers to insurers for claims), and records of specific

health check-ups and health guidance. Some prefectures have also established their own patient information databases including receipt data, examination data, genetic data, and other information, by using regional healthcare networks within the region. Databases are useful for information sharing among healthcare institutions, and for clinical research and backup in cases of natural disasters. Japan is particularly prone to natural disasters such as earthquakes. Therefore, the resilience and robustness gained through cloud storage of health data or storage in multiple locations are crucial to recover from data loss at disaster-stricken institutions and enable continued delivery of the appropriate healthcare.

The government-led Data Health Plan aims to establish a nationwide health record sharing service and is promoting the sharing of patient health records and prescription and other data. [101]. In the future, the government is expected to develop PHR systems by making them accessible to individuals, applying the data to various components of medical treatment and nursing care, and incorporating genomic data [102]. Current challenges with health databases such as the NDB in Japan include the difficulty in (1) collecting and integrating data, because of the decentralisation of health-related data held by multiple owners (payors), (2) discrepancies between insurance disease names and actual conditions when receipts are used as the data source, (3) a lack of outcome data in the NDB, and (4) decentralisation of EHRs because of numerous certified anonymous processors. Furthermore, the data are not linked to hard endpoints, such as birth and death according to certificates. The structure of the data is complex, and analysis requires extensive knowledge of the health system, actual clinical practice, and statistical analyses and methods. Applicants wait for long periods of time to obtain access to requested data because of a strict and cumbersome application process.

When constructing a PHR system, outcome data that can be obtained from EHRs must be linked to the system, and the structure must be designed to enable efficient and useful analysis. To achieve this structure, the government should collect data on an opt-in basis, assuming that the data will be published. The government may also need to expand the legal landscape to create a system that allows relevant parties (individuals and healthcare professionals, and related businesses) to disclose, share, and use PHR to the extent to which individuals consent while ensuring the protection of personal information. Various stakeholders should be able to access the data in a timely manner to promote innovation. The data should be provided to various stakeholders in anonymised, standardised, and cleansed form to enable prompt analysis for HTA, that is, performance evaluation of healthcare institutions and other public benefits.

In Japan, reimbursed online consultations had been available only for patients with certain types of diseases and after an initial face-to-face consultation [103]. In response to the COVID-19 pandemic, initial consultations were also allowed online, first as a temporary and then as a permanent measure in 2021 [104]. Although remote healthcare was not widely used by residents when it was first introduced, because most people have access to healthcare institutions (except for patients on remote islands), utilisation increased during the COVID-19 pandemic, because some patients (particularly those with COVID-19 or chronic diseases) avoided going outside their homes; this reduced the pressure of demand on in-person health services. However, a survey conducted in June 2020 – 2 months after a state of emergency was declared in Japan for the first time – has indicated that although awareness of online consultations exceeded 40%, the utilisation rate was 1.9% [105]. This low rate might have been due to the following reasons: low health insurance fees, the economic burden on healthcare institutions to implement and maintain an online system, and the perceived risks of disclosing personal information.

Treatment mobile applications and other software are expected to contribute to personalised healthcare. Despite a history of approval and reimbursement from public health insurance in Japan, whether software and applications will be widely accepted and used by patients and healthcare professionals remains uncertain. Several measures are needed to popularise digital health management and services such as PHR mobile apps and online healthcare. First, the Japanese government should increase healthcare insurance fees for digital health technologies and provide

subsidies for the initial investment and running costs to incentivise the implementation of health information technologies by healthcare institutions. As of 2021, the reimbursement to healthcare institutions for online healthcare care was lower than that for face-to-face healthcare, and some elements of medical services cannot be reimbursed [106]. Several stakeholders have indicated that the current reimbursement system hinders the dissemination of online healthcare [106]. In April 2022, the central government made adjustments, including raising the healthcare fees for online initial and follow-up check-ups [106]. However, other online healthcare fees, such as the fees for medical treatment and management of specific diseases, will remain lower than those of face-to-face healthcare. The appropriate online healthcare fees should be continually evaluated and reviewed according to benefits and risks. Second, the government should take the lead in building efficient infrastructure architecture. In Japan, systems have often failed to integrate into residents' lives when the system architectures were not user-friendly. For example, a COVID-19 contact tracing mobile app (COCOA) developed by the MHLW has not become part of people's daily lives (see 5.7). The Digital Agency, a new governmental institution mandated to revitalise Japanese society, is expected to take the lead in developing a system that integrates complex infrastructure. A health insurance claim platform that links the online consultation system and EHRs may be effective in reducing the administrative burden on healthcare professionals. Automatic conversion of voice inputs to data would also be advantageous. Third, the health system should add value to patients' lives and healthcare using digital health. The utilisation of individual health and life data (life-log) should be promoted to improve the quality and/or efficiency of healthcare and the lives of residents. The government could support such efforts by providing incentives for relevant research and experimental tests. Fourth, the accessibility of digital health services should be ensured, including for people with disabilities and those with relatively lower health or digital literacy [102]. Although no policy addresses the digital divide caused by SDOH, stakeholders should provide health and digital education in their broader communities, from early childhood education to workplaces, to improve societal digital literacy. Education for residents with low digital literacy, such as older adults and professionals working in primary care, is important. Additionally, development of disability-friendly technologies and services for people with disabilities to access such technologies are needed.

As described in Section 2.6 above, on 7 June 2022, the Japanese government decided to establish the Medical DX Promotion Headquarters (tentative name) and designated three priority areas: creation of a nationwide platform for sharing and exchanging information on all aspects of healthcare, standardisation EMR systems, and digitisation of the revision process of health insurance fees [36]. Consequently, government efforts are expected to accelerate in the above four measures.

5.6 Research and development

Japan has a long history of successful medical R&D. However, in recent years, its competitiveness in R&D has weakened, possibly because of the relatively weak innovation ecosystem for pharmaceuticals and medical devices. Consequently, Japan has lagged behind other countries that are evolving open innovation systems. Contributing factors include the reduction and overseas relocation of the previously local research centres of powerful companies; immature start-ups and investment systems; and underdeveloped resources, including data, funds, and human resources.

A need-driven collaboration between industries and academia will be essential for boosting innovation. However, this collaboration is not functioning properly. Challenges include universities' biases towards technology and seed-driven research; insufficient development of processes and systems for academia-industry collaboration; and inadequate experience. To change the status quo, diverse human resources, including people with interdisciplinary perspectives who can actively collaborate with people outside their organisations, should be fostered. Education should be strengthened by, for example, building combined curricula; exchanging human resources between faculties, such as medicine or pharmaceutical science and engineering; and incorporating digital education and strengthening business skills in the curricula for all faculty.

Many private and public sector bodies are promoting the development of technology and services in the areas of disease prevention and health promotion, globally. However, Japan faces several challenges in this regard. First, data sources are limited and weaker than those in other developed countries, yet data are essential for developing and using such technologies and services. Additionally, no payment systems (i.e., no reimbursement) or evaluation criteria exist for such services; therefore, developers cannot easily predict the return on investment. Furthermore, a fragmented and ineffective health insurance sector impedes the adoption of innovation. Finally, the output of R&D is measured by the number of new drugs, medical devices, and health technologies, or the number of academic articles and patents, whereas evaluation using economic effects and health promotion as indicators has not progressed. To reinforce innovation in this area, a new evaluation system should be developed. Data sources should also be established for evaluation (see 5.5).

To foster innovation, transcending the conventional concept of healthcare and collaborating with other industries becomes increasingly important. Collaboration with other industries in which Japan excels would enhance international competitiveness. For example, a collaboration between the medical and automotive sectors (given that Japan has well-known global brands in the automotive industry) could produce innovative Mobility-as-a-Service products in the healthcare sector and consequently greatly strengthen health system sustainability. Healthcare could be streamlined in regional cities with ageing populations and a shortage of healthcare personnel by providing healthcare in vehicles that travel to remote or depopulated areas. In the Mie prefecture, an experiment demonstration of online medical treatment, online encouragement of health check-ups, and online health guidance with the use of multitasking vehicles is being conducted in six towns with depopulation and ageing populations [107]. Collaboration with the computer gaming industry is another possibility, for example, by using three dimensional imaging of organs and bones in the body based on computed tomography that integrates computer graphics technology to advance diagnostic and medical technology.

5.7 Response to the COVID-19 pandemic

Until December 2021, the number of COVID-19 cases and deaths per population in Japan was significantly lower than that in Western countries, at less than 10% of the number of infections and deaths per population in the UK and USA [108], thus indicating that prevention of the spread of COVID-19 has been somewhat successful in Japan. To ensure the resilience of Japan's health system, the central government enforced special rapid approval systems (special approval, conditional rapid approval, and priority review designation systems) to allow off-label use of pharmaceuticals that indicated potential effectiveness in COVID-19 treatment, and accelerated the approval of new pharmaceuticals and vaccines. Technologies approved through the special rapid approval systems included therapeutic pharmaceuticals such as remdesivir, dexamethasone, baricitinib, antibody cocktail therapy (casirivimab and imdevimab), and sotrovimab, as well as infection testing technologies, including PCR and antigen testing kits. The central government rapidly entered into contracts with Pfizer Inc., Moderna Inc., and AstraZeneca Plc, and secured the necessary vaccine imports. Local governments developed vaccination systems in line with regional needs, securing medical practitioners and vaccination venues, managing vaccination records, and requesting supplies from the government, and vaccinating people in their region. Therefore, although the beginning of vaccination was delayed compared to that in most European Union countries and the USA, at least 73% of the population had received two vaccinations by 5 January 2022, a fairly high percentage relative to those in other countries globally [109].

For stability of medical supplies during crises, the central government had created a plan for disaster prevention before the COVID-19 pandemic, and prefectures were developing health systems that could be activated in the event of crises, on the basis of the central government plan, including designating disaster base hospitals, and storing pharmaceuticals. However, at the beginning of the COVID-19 pandemic, the system was not ready to manage the sudden increase in demand, and the

supply of certain medical goods, including masks, medical protection equipment, ventilators, and PCR test kits, was lacking. Workers were conducting demand forecasting and securing new supply sources by following procedures that did not apply to crisis situations. Because the supply of medical goods is increasingly dependent on imports from outside the country (see 5.4), Japan should strengthen its international political power, given that restrictions on the export of medical supplies may become a political bargaining chip during global crises such as the COVID-19 pandemic. Simultaneously, Japan should also reinforce its domestic supply chain and reconsider the nation's stockpiling strategy according to the estimated manufacturing capacity needed, as a contingency to ensure the stability of medical supply.

To the same extent that the development of vaccines and therapeutic pharmaceuticals lagged behind that in the USA and UK in the battle against the COVID-19 pandemic, Japan is lagging behind the USA, UK, and China in R&D related to new infectious diseases [110]. The Japanese government did not fully recognise that a pandemic is a national security issue, and efforts during non-emergency periods were consequently insufficient [110]. Japan's R&D budget related to infectious diseases is less than those of the USA, UK, and China, each of which allocates at least 10% of the health R&D budget to infectious diseases. Whereas China leads, with an allocation of approximately 27%, Japan sets aside 3.6% of its health R&D budget, which is limited to R&D regarding new strains of influenza and drug resistance. The amount of industry and university activity is also limited compared to that in other countries [110]. From 2016 to 2018, the total number of published Japanese scientific articles related to infectious diseases was 493, one-sixth the number the USA (3,934) and approximately half the number in China (993) and the UK (913) [110]. Using the efforts in the USA, UK, and China as a reference, Japan should establish a robust infectious disease R&D system that leads to the rapid development of technologies to counter new crises in the future. Activities should be undertaken during non-emergency periods, for example, fostering research on vaccines for infectious diseases; building close relationships among governmental bodies, industry, and research organisations; developing new, advanced research facilities; and sourcing the necessary funds.

The central government should also recognise that infectious disease control is a national security issue. To develop a more resilient R&D system for R&D funding during pandemics, the central government should consider not only the conventional approach for providing funding after a step-by-step confirmation of the results, but also a risk-tolerant and concentrated approach for providing large-scale funding. The establishment of a command centre with budgetary authority, both in normal and crisis times, should also be considered, along with the allocation of additional budget for contingencies. This organisation would have functions akin to those of the USA Biomedical Advanced Research and Development Authority, an agency within the USA Department of Health and Human Services that assists in the development and purchase of vaccines, drugs, and therapies needed in times of public health crisis.

To prevent the spread of COVID-19, the central government conducted real-time infection status surveys; tracked individuals infected with COVID-19 and traced those who had been in contact with them; and provided information to the public by rapidly deploying digital technologies (e.g., COCOA and smartphone social networking service apps such as LINE). However, awareness and utilisation of COCOA were low because of a problem in which some users did not receive notifications of positive contacts. Additionally, although existing databases collect and aggregate data for COVID-19 statistics, such as vaccination rates, incidence of adverse reactions, and infection status and symptoms after vaccination (including self-reported outcome data), they are not integrated and linked to individuals. Therefore, room for improvement exists in terms of the promptness of policy decisions based on the risk-benefit analysis of vaccination. In public health crises, as well as in normal times, to ensure the resilience of the health system, data infrastructure and organisation that can promptly collect, analyse, and publicise the required data for policy decisions should be established. This should be linked to existing health databases in order to enable rapid system development and implementation.

5.8 Recommendations

RECOMMENDATION 4A

Promote health technology assessment based on patient value

HTA should be developed to promote value-based healthcare. The evaluation of health technologies should be expanded beyond the current system of cost-effectiveness evaluation, which is used to adjust the prices of some new drugs, in terms of (1) the number and scope of technology types; (2) the value assessed, including a broader definition of patient value, based not only on economic efficiency and effectiveness, but also on social aspects such as well-being; (3) its applications, such as regular adjustment of drug prices after launch, and reflection in treatment guidelines. To achieve this goal, evaluation methods, including metrics and corresponding data sources, must be established. Data sources such as real-world data, including self-reported outcome data, should be developed in a form that can be used by all relevant stakeholders, so that they can contribute to the promotion of HTA (see Recommendation 4D).

RECOMMENDATION 4B

Promote the optimised use of pharmaceuticals

Stakeholders should collaboratively promote efforts to ensure the value-based optimisation of drug use for patients according to comprehensive consideration of efficacy, safety, and economic efficiency. Further efforts include the development and promotion of guidelines for optimal use, formularies, and the promotion of a brand-to-generic switch based on value.

RECOMMENDATION 4C

Secure supply chain stability for pharmaceuticals and other medical resources

When the NHI prices are lowered, the stable supply of essential medicines should not be compromised. Hence, the central government may need to provide financial support for domestic production and the decentralisation of the supply chain for particularly important medicines and other technologies, or adjust minimum NHI prices to ensure stable distribution.

RECOMMENDATION 4D

Develop a health information technology architecture wherein various health records are linked on an individual basis and shared nationwide

To harness the potential of data-driven health, EMRs, whose adoption is lagging, will be implemented across Japan. Therefore, the central government may need to provide support for the costs of introducing and maintaining EMRs and to promote digital education for the ageing healthcare workforce. The establishment of a larger infrastructure that integrates EHRs (i.e., test or treatment and prescription data) and other individual health data, such as life logs, will follow. Such a system could be applied for multiple purposes. For example, it could enable individuals to refer to their data by using their My Numbers when they receive a healthcare service, whereas institutions could promote genomic medicine and daily health. The information infrastructure would be built on the premise that information will be shared with strict protection of personal data. Defining the level of information access for the benefit of each stakeholder would need to be discussed. The architecture should be designed to ensure wide dissemination of the system (see Recommendations 2E, 2F, 4A, 4G, 5A, 5D, 6B).

RECOMMENDATION 4E

Promote digital health technology that can provide value for the public

In Japan, where access to healthcare is good, digital medicine, rather than only online remote consulting, should be promoted. By using life logs and health data, and digital tools to manage daily lives, digital technology can contribute to the quality and efficiency of healthcare. To establish and disseminate such a service, the central government could consider raising the NHI service fee and including the introduction of outcome-based evaluation. Additionally, financial support should be provided to healthcare institutions to introduce and maintain the necessary systems and address

challenges, such as the risk of exposure of personal information and the digital divide (particularly among older adults and people with disabilities). Identifying and supporting those who are unlikely to receive support from others, such as older adults living alone, should be emphasised.

RECOMMENDATION 4F

Develop an innovation ecosystem for healthcare that is internationally competitive

The government should promote policies, such as investment in specific strategic regions and research areas; the accumulation of excellent human resources in Japan and abroad; fostering an environment for start-up businesses; and needs-driven industry-academia collaboration. People development is essential, particularly nurturing experts with an interdisciplinary perspective, who can innovate in collaboration with people outside their organisations. Education is important, and educators should incorporate digital education and business skills into the curricula across all faculties. Collaboration across industries beyond the conventional scope of healthcare could also lead to innovation.

RECOMMENDATION 4G

Evaluate R&D of pharmaceuticals and health technologies by using prevention and health promotion as indicators

Investors, including governmental institutions, should consider R&D in areas such as preventive medicine and health promotion, in which economic activities are currently difficult to motivate. These efforts would also promote the development of a database required for evaluation (see Recommendation 4D).

RECOMMENDATION 4H

Establish finance and R&D support guidelines in preparation for states of emergency

The central government should lead preparations for health crises. Specifically, health technologies related to infectious diseases, such as pharmaceuticals, medical devices, and diagnostic technologies, must be promoted by determining the diseases or pathogens and technologies that R&D should focus on, and implementing the required financial support. Additionally, the central government should estimate the amounts of essential medical supplies needed and the concomitant domestic manufacturing capacity required, then support the restructuring of the supply chain as needed. Furthermore, recognising that infectious disease control is a national security matter, the central government should establish a system to support and lead large-scale clinical trials and manufacturing, to prepare manufacturers for effective R&D in emergencies. For acceleration of R&D, an organisation that manages R&D, with strong budgetary authority during normal and emergency circumstances (similar to the Biomedical Advanced Research and Development Authority in the USA) should be established.

The goal of Japan's future health system is the achievement of a favourable state in which individuals are healthy not only physically, but also in terms of their mental and social well-being. To achieve this goal, integrated effective medical, nursing care, and welfare services must be provided to residents by developing a sustainable and resilient health system to promote the management of individual health and well-being without leaving anyone behind. For Domain 5, this report addresses the status of, and challenges in, the healthcare delivery system's efficiency, quality, and service provision during the COVID-19 pandemic, focusing on medical care, which has traditionally been at the centre of the health system. Furthermore, this report describes the roles of medical and nursing care, and welfare services in building a social system that supports residents' proactive health management and improves their well-being via a positive health approach.

6. DOMAIN 5
Service delivery

6.1 Medical care delivery system

The Japanese medical system does not fully differentiate among medical functions, and primary and secondary care are not always separated. Because residents have free access to medical care, those with mild symptoms do not require a referral from primary healthcare institutions and can receive secondary healthcare services directly at an affordable rate (i.e., the same rate regardless of speciality, location, and public or private facilities). Services provided at secondary healthcare institutions are also provided at small clinics, treatment centres, and the outpatient departments of tertiary healthcare institutions.

Large hospital outpatient services can be used without a referral, but the central government has introduced a referral system from clinics. Patients without a referral from primary care institutions (clinics) are required to pay an additional charge of JPY5,000 when seeing a physician at a large hospital [111]. By introducing the referral system instead of a free access system, the use of outpatient departments at large hospitals has declined, and that of smaller community-based clinics has increased. However, the differences between primary and secondary care institutions remain unclear. Some community-based clinics are equipped with advanced medical devices, such as magnetic resonance imaging scanners, thus enabling service provision equivalent to that at large hospitals at local clinics.

6.2 Efficiency of medical care

In Japan, the central government established Medical Cost Optimisation Plans that led to local government efforts to optimise the medical care delivery system and reduce unnecessary health expenditures. However, Japan's health system may be less efficient than those of other OECD countries. Some progress has been made, for example, the sustained reduction in the number of hospital beds over the past 10 years, but the number of beds per 1,000 people remains high, at 12.8, compared to the OECD countries' average of 4.4 in 2019 [66]; thus, the use of hospital beds may still be less efficient in Japan than in other OECD countries. Although having many beds allows patients to easily and sustainably access medical services, it could lead to excess hospitalisation expenditure. In 2019, the average duration of hospital stay for acute care beds was 16 days. Despite a declining trend in the past 10 years, this was significantly longer than the 6.6 day average in OECD countries [112]. The unscheduled rehospitalisation rate within 30 days showed no remarkable change in 10 years and was approximately 1.2% in Japan in 2020 [113]. Additionally, the number of annual visits to healthcare institutions per person is 12.5, above the OECD countries' average of 6.9 in 2018 [114].

To improve the efficiency of healthcare, including medical care, effective information sharing among healthcare institutions facilitated by health data infrastructure is important. In Japan, data exist in healthcare institutions or local networks, but they are not integrated and cannot be used efficiently. In addition to building a nationwide health data infrastructure, human resources must be developed to analyse data and build a management structure for each institution and region, and for the country.

6.3 Quality of medical care

Advanced medical care in Japan is at a high international standard, partly because of the specialisations of healthcare professionals. However, the quality of primary and chronic care should be improved [115].

In a hyper-ageing society with an increasing number of older people with multiple complex chronic diseases, primary care is essential to provide continuous, preventive, and personalised healthcare services for residents to maintain their health and maximise their ability to participate in society. To strengthen the primary care function, the training of primary care physicians is being promoted in

Japan. The JMA has recommended that patients have a primary care physician, defined as a physician (1) who can be consulted about any medical concern; (2) who is familiar with the latest medical information; (3) who can refer patients to specialists and specialised healthcare institutions when necessary; and (4) who has comprehensive abilities to provide familiar and reliable community medical care, and public health and welfare services [116]. Additionally, the central government is promoting the development of general physicians who provide holistic and continual primary healthcare [77]. However, the roles and functions of primary care physicians and general physicians, and their competencies in performing these functions are unclear. Additionally, systems for acquiring and certifying competencies, policies for incorporating them into the payment system, and processes for including them in the health system have not been clarified.

Furthermore, in an ageing society, to ensure sustainable provision of health services, primary care should be provided at the community level by a multi-disciplinary team of professionals, defined as a primary care team. This team includes healthcare professionals, such as physicians, nurses, public health nurses, caregivers, social workers, and dentists, who specialise in disease prevention and nursing care. To strengthen the functioning and collaboration of primary care teams, healthcare professionals are encouraged to develop the knowledge and skills necessary for the provision of primary care. Residents do not understand the existing primary care system, including the meaning of 'primary care physician'. They are also insufficiently aware that they have their own primary care team that they can access regularly. In Japan, which has a system of free access to healthcare services, public awareness and residents' behaviour should change to promote primary care. The function of primary care should be re-organised on the basis of its value to the public, and understood and agreed upon by the public.

In chronic care, long-term treatment and nursing care are detached from localities and everyday life. For example, the state of end-of-life care (i.e., medical care during the final stages of life), such as feeding tube nutrition and gastrostomy, has been identified as a challenge. In many cases, terminal care requires large medical expenses. Therefore, expanding home healthcare services is important for efficiently providing palliative care.

In Japan, the quality of healthcare may vary by region, and individual risk factors may not necessarily account for health differences among prefectures [61]. Additionally, disparities may exist in the quality of healthcare among healthcare institutions. For example, some clinics do not prescribe effective medicines because their physicians lack the knowledge of physicians in university hospitals. Therefore, promoting medical education is imperative. In areas with a shortage of healthcare professionals, staff with expertise in general practice may need to be hired. Decreasing regional disparities in healthcare delivery systems and access to healthcare services through adjustment of health insurance fees is difficult, because these fees are standardised throughout the country. Therefore, subsidy support should be considered, particularly for maintaining and ensuring access to urgent healthcare for situations such as emergencies and childbirth in rural areas. To decrease regional disparities in the quality of healthcare services, evaluation of healthcare institution performance should be implemented proactively, but a systematic evaluation system has not been developed.

Medical safety is one of the most important issues in health policy for sustainable healthcare provision. To enhance medical safety, a culture of safety must be established that fosters an attitude and mindset prioritising patient safety among healthcare professionals. In 2001, the MHLW established the Patient Safety Action Plan and has been promoting proactive approaches to medical safety measures among many stakeholders, including ministries and healthcare institutions [117]. On the basis of this plan, the MHLW has been constructing an overall framework and developing an organisational structure to promote medical safety measures, including safety measures in healthcare institutions, research on medical safety, education and training for medical professionals, and collection of incident reports related to the use of medicine and medical equipment [117]. Additionally, efforts are underway to raise medical professionals' awareness regarding medical safety; those results have been publicised to restore and build public trust [117]. Healthcare

institutions are also strengthening their organisational governance and improving their medical safety management systems [118]. For example, advanced treatment hospitals select the person ultimately responsible for hospital management by evaluating not only organisational management capabilities but also the qualifications for ensuring medical safety [118].

6.4 Proactive health management and improvement of wellbeing by residents: Healthcare provision through a social system

To increase the sustainability of Japan's health system and ensure the stable provision of healthcare services, positive health, wherein residents proactively manage and develop their own health and well-being, and independently respond to physical, mental, and social issues, is important [87]. To achieve positive health, residents are encouraged to learn about health and medicine on their own, understand their own health, assess whether their health is good or poor, and, on the basis of these considerations, have more fruitful discussions with healthcare workers. The central government should build a social system that supports residents' proactive health management and improvement of well-being.

Focusing on 2035, the central government is striving for healthcare implemented as a social system, as part of its healthcare vision [54 – 119]. Healthcare implemented as a social system refers not only to maintaining the current health system but also to building a health system in which medical, nursing care, and welfare services are integrated to support resident's lifestyles, behaviours, work environments, homes, communities, and economic activities, and values. For the operation of this integrated health system, an environment must be created wherein the public can select services and manage their health independently by managing and using their EHRs and information on nursing care and welfare services. Therefore, a need also exists to promote digital reforms, such as the establishment of a nationwide resident information infrastructure for medical, nursing care, and welfare services.

For health promotion based on social inclusion, the right to improve individual health and well-being (i.e., a positive mental and social state) is fundamental. Individuals should improve their health, and all of society should promote health initiatives, such as making public policies that benefit health and creating environments that support the management of physical and mental health. Promoting proactive health management and improving well-being are essential to accelerating the implementation of healthcare as a social system.

To build a society with fewer health disparities, a social approach is warranted to collectively consider a wide range of SDOH and allowing socially vulnerable residents to receive benefits. This goal is in line with the UHC principle of providing healthcare fairly to all people, the SDG principle that no one be left behind, and the social inclusion principle that no one be left out of society.

The following initiatives are being undertaken regarding SDOH to implement healthcare as a social system wherein members of the public independently maintain their health and improve their well-being:

- In a super-ageing society, the extension of healthy life expectancy should be achieved while curbing rising healthcare expenditure, without reducing the quality of healthcare services. To achieve this, Japan advocates for a CICS (see 2.3), wherein residents live better lives until end of life, in an environment in which they want to live. The CICS provides a home care, medical care, nursing care, disease prevention, and livelihood support in an integrated manner, assuming autonomy and mutual support among residents.
- Because the independent management and promotion of health by residents are easily influenced by SDOH, policies that support residents with negative social determinants and reduce health disparities have been put in place. These policies include support for medical care, living expenses, and housing for low-income residents, such as non-regular employees and low-income families with children, on the basis of surveys related to SDOH and health risks.

- To improve health literacy among those who have low health awareness, life design is being advocated, wherein members of the public independently participate in and design the management of their own health and well-being. This framework is supported by society, and societal structures that provide accurate advice regarding the necessary services are being promoted.

Healthcare should be developed as a social system in partnership with healthcare professionals and the public. Residents should learn how to define their own health and well-being within a positive health framework, according to individual values, and should not necessarily focus on achieving an objective state of health. To facilitate learning about health, school education should be reviewed, residents should be encouraged to learn from one another, and opinions of the public should be reflected in the expectations that the healthcare system has of healthcare workers.

6.5 Service provision in response to the COVID-19 pandemic

The provision of healthcare in response to the COVID-19 pandemic has been partially successful. By December 2021, the cumulative number of COVID-19-related deaths per million people in Japan (approximately 146) was much lower than that that in the UK (approximately 2,150) and USA (approximately 2,390) [108]. However, during the COVID-19 pandemic, a shortage of acute care beds occurred, although the overall number of beds was high. The percentage of healthcare institutions that were prepared with acute care beds to accept critically ill patients with COVID-19 was low, thus highlighting one aspect of the weak resilience of the Japanese health system. A shortage of advanced acute care beds, such as intensive care unit beds or beds with ventilators also existed, although more beds have been added. Furthermore, particularly in 2021, the number of healthcare institutions that accepted patients with mild and moderate symptoms was insufficient, and patients had no choice but to recover in hotels or at home. In many instances, delayed intervention led to death when symptoms became acute. The possibility that some private hospitals might not have been able to rapidly allocate beds and human healthcare resources must be further investigated. In Japan, where approximately 80% of healthcare institutions are privately operated, healthcare institutions have no legal obligation to accept patients with COVID-19, and the central and local governments cannot force healthcare institutions to cooperate. To rapidly allocate hospital beds and healthcare human resources during emergencies, appropriate regulation may need to be considered, wherein the central and local governments have the authority to require collaboration from healthcare institutions.

During the COVID-19 pandemic, primary care was unable to sufficiently fulfil its role in early diagnosis and prevention of the spread of infection. However, in some instances, the responsibility of primary care in treating patients with infectious diseases was fulfilled. For example, the Tokyo Metropolitan Medical Association established a regional PCR testing centre to prevent the collapse of healthcare services and reduce the burden on public health centres. Some primary care, nursing care, and welfare facilities were unable to fulfil their primary care roles and restricted acceptance of patients with fevers or other suspicious symptoms. Thus, the UHC philosophy of delivering medical care that leaves no one behind was not always realised.

The response to the COVID-19 pandemic also highlighted the disjunction between public health centres and healthcare. Although the public health centres were the points of contact for patients with fever, in some cases, the symptoms worsened because of delays in coordination with healthcare institutions, thus preventing patients from promptly visiting healthcare institutions or being hospitalised. Therefore, cooperation between public health centres and healthcare institutions must be strengthened before emergencies, and an emergency system should be built that enables rapid healthcare coordination within the community with the public health centres.

In the future, planning during non-emergency periods for the provision of healthcare during emergencies, focusing on prefectures, should be beneficial, on the basis of experience from the

COVID-19 pandemic. Because there was a shortage of hospitals and hospital beds that received patients, the government should also consider how to strengthen coordination between the central and prefectural governments in emergencies.

The results of prevention and treatment of COVID-19 and the effects on the treatment of other diseases and the health status of residents should be evaluated. During the COVID-19 pandemic, because of the increased demand for human resources to treat COVID-19, resources could not be allocated to regular medical care. Therefore, regular medical care was discontinued for non-urgent outpatients or patients with chronic diseases, and non-urgent surgeries were postponed [120]. However, insufficient reports are available regarding the effects of these measures on health outcomes and healthcare economics. Analysis and consideration of these effects should continue, considering the long-term effects.

Because the economic damage caused by the COVID-19 pandemic has made employment insecure, many unemployed people, single parents, young carers, and foreign workers have been living in poverty; consequently, many people cannot access healthcare or achieve well-being. Efforts must be made to clarify challenges, identify people who need support, and provide economic and social support to them, by considering social factors such as poverty. In addition, a data infrastructure and an evaluation system for medical and nursing care, welfare services, and employment should be established. These efforts would facilitate building a society that maximises the physical and mental health and well-being of every individual, leaving no one behind (see Case study (1).

6.6 Recommendations

RECOMMENDATION 5A

Improve the efficiency of healthcare service delivery by reducing unnecessary hospital stays and healthcare visits

To accomplish this aim, (1) functional differentiation of healthcare institutions such as acute and convalescent hospitals should be promoted, (2) outcome-based incentives should be introduced, (3) health data sharing among healthcare institutions should be strengthened by building a data infrastructure that includes health insurance claim receipt data and laboratory data, (4) human resources, including people who can analyse these data, should be developed, and (5) data management mechanisms at the hospital, regional, and country levels should be established (see Recommendation 4D).

RECOMMENDATION 5B

Enhance the functioning of primary care teams (multi-disciplinary teams of healthcare professionals, including primary care physicians and general physicians)

The central government should take the lead in clarifying the functions of primary care teams and their positions in the health system, developing criteria for their functional assessment and evaluation methods for payment and building consensus among stakeholders. Primary care teams are multi-disciplinary teams of healthcare professionals, including primary care physicians and general physicians, as well as nurses, public health nurses, caregivers, social workers, dentists, and other multidisciplinary professionals that provide comprehensive care in the communities where patients live. The benefit of having a primary care team should be explained and promoted to the public. Additionally, primary care professionals should be equipped with expertise in general practice and skilled in caring for residents and facilitating their cooperation. For evaluation of payment, incentives could be introduced, for example, increasing health insurance fees according to the number of patients treated in primary care teams and evaluation of the quality of treatment outcomes.

RECOMMENDATION 5C

Promote policies to solve healthcare inequalities among regions

The results of healthcare institution performance evaluations and evidence of regional inequalities in treatment outcomes with diseases that require early detection and early intervention, such as heart attacks and strokes, should be made public. In regions needing improvement in the quality of healthcare, healthcare provision systems should be reviewed, including the establishment of public health centres that can perform advanced acute treatment, and healthcare professionals should be recruited through use of incentives. Subsidy support for urgent healthcare services in rural areas, such as emergency medicine and childbirth, should be considered.

RECOMMENDATION 5D

Support health promotion, and reimagine healthcare as a social system that allows individuals to make independent decisions regarding their health and life choices

Healthcare should be implemented as a social system that enables residents to receive the necessary services and accurate advice to develop an appreciation for the value of health, and to proactively engage in and design their own health management. To achieve this goal, the government, educators, healthcare professionals, healthcare companies, and NPOs should educate the public and foster awareness by proactively providing information related to the importance of independently managing one's health, diseases, treatment, healthcare institutions, and daily living. Furthermore, by building a health data infrastructure across Japan, an environment should be provided through which the public can manage and use their EHRs and their nursing care and welfare service history; choose services; and manage their health independently (see Recommendation 4D).

RECOMMENDATION 5E

Promote policies that consider SDOH to reduce inequalities in healthcare

Social inclusion should be at the core of health policy to achieve a health system that does not leave anyone behind, which is the principle of the SDG and UHC. For example, the proposal of policies that decrease health inequalities should be promoted by considering a wide variety of SDOH and include minority groups such as immigrants and foreign workers; lesbian, gay, bisexual, transgender, and other individuals; and those who are socially vulnerable (e.g., people with disabilities). Diversity should be recognised, and the creation of a society in which everyone can live their lives authentically and develop a sense of value for their own health and way of life without facing discrimination in finding work or accessing healthcare should be promoted.

RECOMMENDATION 5F

Develop national guidance that clearly outlines roles and responsibilities among different sectors of healthcare system during health crises

An emergency plan should be developed for the adjustment of hospital beds and the allocation of healthcare professionals in response to the increased demand for advanced acute and acute care hospital beds during health crises such as pandemics. Additionally, cooperation with local healthcare institutions and public health centres should be strengthened to promptly request the admission of patients and coordinate their admission and discharge. Consequently, the cooperation request functions of central and local governments may also need to be strengthened. The roles and functions of primary care services should also be clarified in the guidelines for the healthcare provision system in emergencies. For example, primary care institutions should be clearly stated to be the initial point of service for patients with fever, to reduce the burden on secondary and tertiary care institutions. On the basis of these guidelines, healthcare professionals should be educated to prepare for pandemics or other health crises.

7. DOMAIN 6

Population health and health promotion

For Domain 6, this report analyses changes in average life expectancy, healthy life expectancy, health loss related to non-communicable diseases (NCDs), risk factors associated with NCDs, and deaths during the COVID-19 pandemic. On the basis of the findings of these analyses, public health policies and prevention initiatives that should be implemented for residents to promote population health in Japan and Japan's initiatives to counteract the low birth rate are addressed.

7.1 The importance of addressing NCDs for extending healthy life expectancy

Extending healthy life expectancy prevents the deterioration of QOL and reduces the burden of medical and nursing care, thereby improving the sustainability of the health system. This objective is also a major aim of the Health Japan 21 project led by the central government to promote the health of residents [11]. The MHLW publishes statistics on healthy life expectancy and how it differs from average life expectancy. In addition to MHLW, other sources such as the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD), which provide various health statistics across countries, have also reported healthy life expectancy in Japan and assessed the difference between healthy life expectancy and average life expectancy.

According to MHLW statistics, in 2016, the average life expectancy was 81.0 years for men and 87.1 years for women, and the healthy life expectancy was 71.6 years for men and 73.9 years for women. In 2010, the average life expectancy was 79.6 years for men and 86.3 years for women, and the average healthy life expectancy was 69.9 years for men and 72.8 years for women [121]. Thus, the difference between average life expectancy and healthy life expectancy was 9.4 years for men and 13.2 years for women in 2016, and the difference narrowed from 9.7 years for men and 13.5 years for women in 2010 [121]. However, according to the GBD, in 2019, the average life expectancy for men and women combined was 84.8 years, and the healthy life expectancy was 73.8 years, whereas in 2016, the average life expectancy was 83.3 years, and the healthy life expectancy was 72.7 years [122]. Therefore, the difference between average life expectancy and healthy life expectancy increased from 10.6 years in 2016 to 11.0 years in 2019 [122].

Differences between the MHLW and the GBD estimates might result from differences in how healthy life expectancy is calculated [123]. The MHLW calculates healthy life expectancy on the basis of individuals' self-assessment of their own health status, whereas GBD uses an assessment based on the number of years lived with disability [123]. Differences might also exist because the MHLW estimates include only Japanese people living in Japan, whereas the GBD estimates include both Japanese people and foreigners living in Japan. Nonetheless, the central and local governments should promote health and preventive initiatives to shorten the approximately 10-year difference between average life expectancy and healthy life expectancy, which occurs when people live in poor health conditions. In Japan, where the population is ageing, and the working-age population is decreasing, the need for foreign workers is increasing. Therefore, policies that take diversity, including foreigners, into account will be required, by using MHLW statistics that include both Japanese people and foreigners.

Policies aimed at extending healthy life expectancy are required and should be based on research regarding the causes of loss of health among residents. At least 80% of the causes of loss of health in Japan are NCDs, according to estimates with disability-adjusted life years (DALYs), a mixed indicator of death and disability provided in the GBD statistics [124]. In 2019 in Japan, 7 of the top 10 causes of loss of health, on the basis of the number of DALYs caused by NCDs, affected mainly older adults: stroke, back pain, Alzheimer's disease, ischemic heart disease, lung cancer, age-related hearing loss, and diabetes mellitus [124]. In particular, diabetes mellitus and Alzheimer's disease have increased by approximately 20% in DALYs over several years [124].

In an evaluation based on age, the health condition of children under 5 years old has improved in the past 30 years [124]. In particular, from 2010 to 2019, the total DALYs declined by 22.8% [124]. This improvement might have resulted from successful public health efforts related to infectious diseases and prenatal care. However, the same decrease was not observed among older adults [124].

The proportion of years lived with disability to DALYs is gradually increasing and comprised almost half of the DALYs (48.2%) in 2019. Additionally, the mortality rate is decreasing every year [61]. These trends suggest a challenge in growing demand for healthcare services as Japan's population ages, and the number of residents with chronic diseases increases. However, the current healthcare delivery system may not be able to adequately cope with the growing demand [22]. For example, although the total number of medical professionals and hospital beds is expected to meet the demand to some extent, the uneven distribution of medical professionals hinders provision of medical care, particularly in areas where the population is ageing. Additionally, insufficient progress has been made in terms of measures such as skill mix regarding the reduction in working hours of healthcare professionals to improve their working conditions. Currently, a shortage of nursing care professionals for rehabilitation also exists (see 4.2).

According to MHLW statistics, malignant neoplasms, heart disease, senility, cerebrovascular disease, and pneumonia are the most common causes of death in Japan [125]. The number of deaths related to dementia – such as Alzheimer's disease, which increases with age – is rapidly increasing, according to the GBD statistics [124], but is less frequently reported as a cause of death in the MHLW statistics [125]. Deaths related to dementia may be underestimated because dementia is not widely recognised among healthcare professionals in Japan as a fatal disease. For example, if a patient with dementia dies of aspiration pneumonia, aspiration pneumonia is listed as the cause of death on the death certificate. Additionally, most cases in which senility is the diagnosed cause of death are associated with severe dementia [126].

7.2 Assessment of deaths during the COVID-19 pandemic

Mortality data from the MHLW's Vital Statistics of Japan are important for improving healthcare and public health services. The data are also important for assessing direct and indirect population-level effects of viral pandemics and the current COVID-19 pandemic. However, in Japan, death statistics are not aggregated and published in a timely manner. Rapid data aggregation and publication of deaths are critical to effectively assess the influence of the pandemic on hard outcomes. Weekly and real-time data aggregation systems are working in Europe and the USA [127]. However, in Japan, data on the number of deaths due to all causes are released with a 2-month delay (and are known as Prompt Vital Statistics), and data on the number of deaths, according to cause of death, are released with a 5-month delay (and are known as Monthly Vital Statistics).

During a pandemic, deaths may also increase because of indirect effects, such as healthcare shortages, in addition to deaths directly related to infection. To examine the effects of the COVID-19 pandemic, research groups in the MHLW continually estimate the number of excess deaths, which indicates the extent to which the actual number of deaths exceeded the number of expected deaths statistically estimated from historical data [128]. As of February 2022, estimates of excess deaths from all causes up to October 2021 since the onset of the pandemic had been provided. The total number of deaths decreased, and no significant excess deaths were observed nationwide in 2020 [129]. From April to June 2021, in contrast, the number of excess deaths was unusually high in some prefectures, such as Osaka, Hyogo, and Hokkaido [129]. Deaths of patients with COVID-19 under home care during the peak of the COVID-19 pandemic in 2021 might have increased, although verification is required.

In addition, crucial statistics must be published in a more analysis-friendly data format. Currently, Prompt Vital Statistics and Monthly Vital Statistics are aggregated into specific units. For example, Prompt Vital Statistics are aggregated by prefecture. Monthly Vital Statistics are aggregated by sex, age (cohorts of 5 years), and prefecture; or by sex and age (cohorts of 5 years), and causes (the condensed list of causes of death in Japan according to the international classification of diseases (ICD) list at the three-digit level) [130]. However, daily or weekly data, as well as place of death, are not included in Prompt Vital Statistics and Monthly Vital Statistics. Additionally, data on causes of deaths in Monthly Vital Statistics are not based on the detailed ICD list at the four-digit level.

Therefore, these data are unsuitable for rapid and detailed assessment of the effects of the COVID-19 pandemic, which also has caused a variety of indirect health effects in various sociodemographic groups.

Approximately 2 years is required for individual data to become externally available and accessible to third parties. Even if the data are limited in accuracy and scope, publishing data on a weekly basis in a timely manner and revising/adding to the data later may be necessary. Specifically, data stratified by the attributes listed above (or more attributes, including foreign nationals) should be available in Prompt Vital Statistics and Monthly Vital Statistics.

7.3 Increase in risk factors related to NCDs

Among Japanese individuals, increased exposure to several potentially preventable metabolic risk factors elevates the incidence of NCDs, thus leading to increased DALYs. These risk factors include high systolic blood pressure, high fasting plasma glucose, high levels of low-density lipoprotein (LDL) cholesterol, BMI, and renal dysfunction. Several studies have highlighted the urgent need to strengthen public health efforts that combat these risk factors [131]. Metabolic risk factors accounted for 18.2% of the total DALYs in 2019, an increase from 17.3% in 2010 [132]. Additionally, potentially preventable behavioural risks, such as tobacco smoking, alcohol consumption, high sodium intake, and low bone density require attention [132].

Metabolic risk factors are associated with numerous deaths. In 2019, 196,385 deaths were associated with high systolic blood pressure, followed by 101,141 deaths associated with high hyperglycaemia, 78,418 deaths associated with renal dysfunction, 75,782 deaths associated with high LDL cholesterol, and 51,822 deaths associated with high BMI [132]. Metabolic risk factors accounted for 24.7% of the total number of deaths in 2019, remaining almost unchanged from 24.6% in 2010 [132]. In addition to the five metabolic risk factors described above, in 2019, the top 10 risk factors related to the mortality rate included tobacco smoking (199,396 deaths), alcohol consumption (47,795 deaths), and high sodium intake (38,087 deaths) [132].

7.4 Public health efforts to address risk factors that increase the disease burden of NCDs

The central government established the Health Japan 21 project to promote the health of residents and the prevention and treatment of chronic diseases, including NCDs [11]. The central government is supporting local governments by allocating budgets and leading activities focused on the extension of a healthy life expectancy, reduction of health inequalities, prevention of the onset and development of lifestyle diseases, improvement and maintenance of the required functions to sustain life in society, maintenance of the social environment to support and protect health, and improvements in lifestyle and the social environment [11]. As part of this project, the health status of residents is evaluated against targets set for 2022. The final assessment in 2022 indicated that several indicators, such as the extension of healthy life expectancy, age-adjusted mortality rate for cerebrovascular disease, and age-adjusted mortality rate for cancer among those younger than 75 years of age demonstrated improvement [133].

The following aspects had not improved or had deteriorated; thus, enhancement and strengthening of initiatives will be required to achieve the targets:

- Prevention of the onset and development of NCD targets for decreasing the number of patients with dyslipidaemia, decreasing the number of patients with metabolic syndrome and those with pre-diabetes, decreasing the number of new patients per year requiring dialysis for diabetic nephropathy, increasing the percentage of people who continue diabetes treatment, and increasing awareness of chronic obstructive pulmonary disease.

- Improvement and maintenance of the functions necessary for engaging in social life targets for reducing the number of people with psychological distress equivalent to mood and anxiety disorders, increasing the number of children with appropriate body weight, and increasing the percentage of the population aware of locomotive syndrome.
- Maintenance of the social environment to support and protect health targets for strengthening community ties (increasing the percentage of citizens who believe that people help one another in the community where they live).
- Improving lifestyles and the social environment targets for nutrition and diet, including increasing the number of people maintaining appropriate body weight, decreasing salt intake, and increasing intake of vegetables and fruits; targets for improving physical activity and exercise, including increasing the number of steps taken in daily life activities and increasing the number of people who exercise regularly; targets for promoting rest, including decreasing the number of people who do not get sufficient sleep; targets for reducing alcohol consumption, including decreasing the number of people whose alcohol consumption levels increase the risk of NCDs; and targets for improving dental health, including maintenance and improvement of oral function.

In Japan, smoking greatly affects the health of residents. Despite rigorous scientific evidence of the harmful effects of smoking, in 2019, approximately 26% of men and 7% of women smoked every day [134]. In the final assessment of Health Japan 21, the smoking rate among adults was 16.7% in 2019, representing a decrease from 19.5% in 2010 when the plan was formulated; however, reaching the target of 12.0% by 2022 will be challenging [133]. The target for smoking among minors and pregnant women is set at 0% by 2022. In 2019, smoking among minors was steadily decreasing, but 2.3% of pregnant women were smokers, thus making the 2022 goal difficult to achieve [133]. For passive smoking in the workplace, the goal is that 100% of workplaces implement countermeasures against passive smoking by 2022; however, by 2018, only 71.8% of workplaces had implemented such measures [133]. Japan is lagging globally in tobacco regulations and does not fully meet the standards set by the WHO's Framework Convention on Tobacco Control regarding the price of tobacco, packaging [136], and banning smoking in public spaces [137]. This beneficial situation for smokers might be related to tobacco taxes being one of the most important sources of the government's revenue [138]. Notably, tobacco smoking remains the largest cause of health losses in both DALYs and mortality rates for men.

Regarding management of blood pressure and preventing hypertension, although the number of patients with hypertension has been steadily decreasing, room for improvement persists [139]. In the final assessment of Health Japan 21, the average systolic blood pressure among people 40–89 years of age was 137 mmHg for men and 131 mmHg for women in 2018, whereas the target for 2022 is 134 mmHg or less for men and 129 mmHg or less for women [133]. Community and clinical efforts, including the early detection of hypertension, improving lifestyle habits such as reducing salt intake, and effective treatments, have the potential to decrease the mortality rate of cardiovascular diseases and increase the average life expectancy, as has occurred over the past 20 years [61]. Continued healthcare education and strengthening compliance with the recommended criteria in the standard clinical guidelines for general clinics [140] might potentially be the key to expanding the scope of effective outpatient services and ensuring patient compliance [115].

Other delays in achieving the goals for lifestyle improvements were found during the final assessment of Health Japan 21 in 2022 [133]. For example, the percentages of residents 40–79 years of age with LDL cholesterol of 160 mg/dl or higher were 9.8% of men and 13.1% of women in 2019, values above the 2022 targets of 6.2% of men and 8.8% of women [133]. The target for the number of patients with metabolic syndrome was set to decrease by 25% from approximately 14 million in 2008, but the number increased slightly to approximately 15.16 million in 2019 [133]. The average salt intake per person was 10.0 g/day in 2018–2019, a value higher than the target of 8.0 g/day by 2022 [133]. The percentage of residents consuming alcohol in volumes that increase the risk of NCDs (i.e., net daily alcohol intake of 40 g or more for men and 20 g or more for women) was

14.9% of men and 9.1% of women in 2019, above the target of 13.0% for men and 6.4% for women by 2022 [133].

To reduce the influence of several NCD risk factors such as high fasting plasma glucose, high BMI, high LDL cholesterol, alcohol consumption, and high sodium intake, a comprehensive prevention package, including improving lifestyle and eating habits, and expanding the scope for the early prescription of hypoglycaemic medicine, is needed. In previous research predicting future changes in Japan's health losses (DALYs) related to risk factors in eating habits [140–142], differences have been found between future food consumption scenarios in terms of predicted health losses. Thus, future policies targeting risk factors may potentially greatly affect the trajectory of Japan's risk factor profile and related health losses.

The number of underweight youths in Japan is also increasing. Because of an unbalanced diet and extreme weight loss, approximately 20% of women between the ages of 15 and 29 have a BMI less than 18.5 [134]. Concerns have been raised regarding osteoporosis, irregular menstruation, the birth of underweight babies, premature births, and pregnant women with diabetes mellitus. The percentage of underweight women in their twenties has almost reached the target of 20% by 2022 set in Health Japan 21, but improvement is needed in the future [133].

In Health Japan 21, rest is a priority area for improving lifestyle, and sleep and working hours have been evaluated [133]. According to the final assessment, the percentage of residents who do not get sufficient rest through sleep was 21.7% in 2018, representing a significant increase from 18.4% in 2009, thus increasing the difficulty of achieving the 15% target by 2022 [133]. Additionally, the percentage of employees who worked 60 hours or more per week was 5.1% in 2020, a value significantly below the 9.4% in 2011; however, the target of 5% by 2022 has not been reached [133]. Although inadequate sleep and long working hours are associated with health risks such as hypertension, other cardiovascular diseases, and diabetes mellitus [143, 144], these are not currently assessed in the GBD [131].

Because disabilities caused by NCDs account for a large fraction of health losses, and health expenditures related to these disabilities are increasing, finding new, more effective, and efficient methods of prevention, early detection, and treatment are an urgent and pressing challenge. With the rapidly ageing population, the demand for healthcare services to prevent and manage chronic diseases that cause disabilities will require more funding, a strong commitment from the central government, accountability based on evidence generated from better quality data, and cooperative efforts to prioritise those in the weakest positions in society [145]. Therefore, many stakeholders must align their efforts and collaborate.

Investment in health research and health measures that meet public health needs is one of the most important public health policy issues in Japan, as in other countries. To allocate limited resources appropriately, research priorities and other activities that should be conducted must be determined. An important benchmark for this assessment is the comprehensive DALY health index, which reflects population ageing and public health needs. In contrast, a previous study has suggested that public research funds are not necessarily properly allocated to research for diseases associated with lower QOL in Japan. For example, funding for research investigating cancer and gastrointestinal diseases (per DALY) is relatively high; however, that for research investigating cardiovascular and musculoskeletal diseases is low [146].

The NCDs and underlying risk factors discussed are related to an increased risk of severe disease because of COVID-19 [147, 148]. Urgent measures against NCDs and the COVID-19 syndemic are needed to build a resilient health system, improve the health of residents, and strengthen resistance to future health crises.

7.5 Efforts to promote prevention of NCDs in Japan

Most of the efforts to promote prevention of NCDs in Japan are left to local governments, payors, and the public. To promote the health of residents and prevent lifestyle diseases, local governments implement specified health check-ups and guidance (see 2.2). A large-scale study using the NDB has suggested that metabolic syndrome, obesity, and cardiovascular risk are reduced if residents receive the specified health guidance [17].

Efficient implementation of the Plan-Do-Check-Act cycle is necessary for the implementation and effect measurement of the specified health check-ups and guidance by using social marketing methods that effectively deliver messages to specific population segments (e.g., male/female, young/old) through Internet of Things (IoT) technologies. Additionally, local governments should establish a social system that supports independent health management of residents by combining opportunities to be healthy with entertainment by using ICT technology such as smartphone applications and wearable devices [149]. Healthcare professionals in primary care teams forming the core of preventive healthcare should manage the health of residents after considering the daily health data collected by wearable devices and smartphone applications. However, because of the ageing of both residents and healthcare professionals, particularly physicians, the digital divide could lead to the exclusion of many older individuals. Their digital literacy must be improved through education.

Apart from the prevention of NCDs, central and local governments should raise public awareness of tuberculosis, because of its high incidence (including recurrence) in people 70 years or older and the delay in its treatment in 20.4% of patients of all ages [150].

Additionally, the MHLW educates residents on how mental health disorders may affect anyone, and early treatment is important [151]. For residents with mental disorders – under the supervision of the central government – local governments, public health centres, and community health centres provide consultation; financial support; and support for employment, housing, and living to promote their independence and social participation [151]. For example, public health centres, municipalities, and mental health welfare centres provide consultation services for mental health problems and the relevant medical care [151]. Furthermore, public employment security offices and employment and livelihood support centres for people with disabilities provide support for working while coping with mental disorders and other disabilities, and returning to work after a leave of absence [151] (see 4.3). On the basis of the Services and Supports for People with Disabilities Act, residential support, daily care, and behavioural support are provided for residents with mental disorders to integrate them into the local community [151, 152]. Furthermore, residents with mental disorders are also provided with financial support for medical expenses concerning the treatment of mental disorders, tax deductions, and other benefits, such as allowances and pensions [151].

In Japan – where nursing care expenses are rising, and nursing care personnel are in short supply – preventing older adults from requiring nursing care or support, by reducing or preventing the deterioration of their conditions, is important [153]. Preventive care aims to improve the QOL of older adults by supporting their efforts in finding a purpose in life and self-realisation [153]. For older adults whose daily functioning, such as motor function and nutritional status, has declined, rehabilitation efforts are recommended to allow them to conduct their daily activities and encourage them to participate in family and society [153]. For example, with the CICS system, local governments have been making efforts to maintain and improve resident health conditions by promoting continued exercise, improved nutrition, and oral care. Local governments have also been making efforts to strengthen the prevention of falls, frailty, depression, and dementia by encouraging older adults to participate in group activities such as sports, volunteer work, and hobbies [153].

To prevent NCDs in the future, the central government actively promotes school education on health. In the Health Japan 21 project, initiatives are underway to promote health education in schools (1) to develop healthful lifestyles in terms of nutrition, eating habits, and exercise; (2) to

raise awareness through surveys of the dietary intake of elementary and junior high school students; (3) to ascertain the status of children's physical fitness and exercise habits; and (4) to use this information to improve teaching content of instruction [11]. The school curriculum should aim to foster positive health, which is the ability to adapt and manage one's own health when facing social, physical, or emotional problems.

The central government should lead the development of a system for promoting prevention in the same way in which it has developed the system for the treatment of injuries and diseases in the health insurance system.

7.6 Countermeasures for the declining birth rate

To prevent the working-age population from shrinking because of the declining birth rate, the central government has formulated the Outline of Measures to Cope with Society with Declining Birthrate. This policy promotes the creation of a society in which men and women respect each other's way of life and plan for marriage, pregnancy, childbirth, and child-rearing [154]. In this society, residents can marry and have the number of children they desire, when they want to [154]. However, the declining birth rate has not been controlled [155]. The total fertility rate has been almost flat for the past 20 years and was 1.36 in 2019 [155]. The number of births has been decreasing and was approximately 865,000 in 2019 [155]. Additionally, Japan's social security costs related to family policies in the 2017 financial year were 1.56% of GDP, which is less than that of European countries (e.g., 3.24% in the UK and 3.40% in Sweden) [156]. Additionally, Japan faced a backlash by some stakeholders against sex education, because the sex education conducted in elementary and junior high schools does not account for the developmental stage and receptive capacity of students or the nature of sex education itself [157, 158]. Thus, sexual and reproductive health and rights and life planning education have not been widely disseminated in Japanese society. Sexual and reproductive health and rights and life planning are crucial national strategies, and sufficient funding for activities, such as information provision, education, and related-healthcare services, must be allocated. Sexual and reproductive health and rights are also crucial for gender equality and women's empowerment [159].

7.7 Recommendations

RECOMMENDATION 6A

Establish a national system for the rapid disclosure of mortality statistics that enables rapid feedback and various analyses at the local level

Data on mortality statistics that are important information for improving healthcare and public health must be published promptly through the re-organisation of death registries and central reporting procedures. Not only monthly data by sex, age, and prefecture, but also daily or weekly data, data on place of death, and data on categories of causes of death according to the detailed ICD list at the four-digit level should be made available in Prompt Vital Statistics or Monthly Vital Statistics. These data would enable rapid scientific verification of the influence of a pandemic on mortality or other health crises, and lead to timely and appropriate policy planning and implementation.

RECOMMENDATION 6B

Promote allocation of resources for research and activities that are data driven and in line with public health needs

To extend healthy life expectancy, which is one of the aims of the Healthy Japan 21 project, the limited investment resources must be appropriately allocated to health research and activities that meet public health needs, by using benchmark data such as DALYs, a comprehensive health index that reflects population ageing and public health needs (see Recommendation 4D).

RECOMMENDATION 6C

Intervene to reduce major risk factors for NCDs

To reduce the number of residents with NCDs, particularly dyslipidaemia, metabolic syndrome, and pre-metabolic syndrome – factors showing poor improvement in the progress evaluation of Healthy Japan 21 – risk factors for these NCDs must be addressed. Therefore, the relationship between risk factors and deteriorating health should be analysed with in-depth data, and all people at risk should be identified. According to the results, the central and local governments should promote smoking cessation; early detection, effective prevention, and treatment of hypertension, hyperglycaemia, and mental disorders; and changing of lifestyle habits, such as reducing salt intake. Moreover, additional taxes for clear health risks such as tobacco, alcohol, and sugar consumption should be considered (see Recommendation 2A).

RECOMMENDATION 6D

Promote preventive healthcare services

To promote the health of the people living in Japan, preventive services with expected cost reduction benefits or significant health effects must be evaluated, even if costs are incurred for introducing the services. Additionally, a fundamental review of health insurance fees and experimental research should be implemented to promote the development and popularisation of preventive services. For example, health promotion efforts such as behavioural modifications and health guidance using IoT technology, such as wearable devices and smartphone applications, should be encouraged. Additionally, social marketing methods should be used to deliver useful messages for each population segment. To manage the effects of the digital divide on ageing residents and healthcare professionals in primary care teams, which play a central role in preventive healthcare, education to improve digital literacy should be promoted (see Recommendation 5A).

RECOMMENDATION 6E

Implement early education in schools to prevent NCDs

To prevent future NCDs, proactive action should be taken in school education related to health, as is also promoted in the Health Japan 21 project. For example, children should be provided with opportunities to learn about healthful lifestyle habits related to nutrition, diet, and exercise, and acquire knowledge of positive health. On the basis of this knowledge, health learning ability and habits will be cultivated, and individuals can consider the value placed on health and take action to maintain their health.

RECOMMENDATION 6F

Promote measures to provide family planning and reproductive health education and services for young people

Awareness, education, and services related to life planning and sexual and reproductive health and rights should be strengthened by expanding public investment in family policies. A society in which individuals can realise their preferences regarding marriage and children, rather than having a particular set of values imposed upon them, should be created.

8. DOMAIN 7
Environmental sustainability

Environmental sustainability is an important element in maintaining the sustainability of the health system. Environmental degradation, such as that due to global climate change and air pollution, should be curbed by reducing the climate footprint, including emission of carbon dioxide (CO_2) and air pollutants across the entire health system (e.g., healthcare institutions and the distribution of healthcare products). Importantly, these efforts will also reduce the health risks that are increased by environmental degradation, thus leading to optimised health expenditure, health promotion, and increased sustainability in the health system.

For Domain 7, this report addresses Japan's overall approach to environmental issues, efforts to reduce the climate footprint of the health system, countermeasures against health risks that are increased by climate change and air pollution, and the sustainable use of international genetic resources.

8.1 Efforts to address environmental issues in Japan

From a global perspective, Japan's environmental policies are stringent, having achieved positive results regarding the indicators of the environmental performance index in 2020 and ranking 12th among 180 countries [160]. The environmental performance index, managed by the OECD, is used to evaluate market-based policies, such as emission taxes or energy trading schemes, and non-market-based policies, such as emission standards and R&D subsidies [160, 161]. Although Japan has been praised for making steady progress in terms of its environmental policies, areas that require development in comparison to other developed nations remain [160, 161]. Japan has stipulated CO_2 emission reduction targets of approximately 1.042 billion t-CO_2 eq by 2030, across all areas, including industry (e.g., the health system), households, and transportation [162]. To meet the targets, Japan has been pursuing energy conservation activities, utilisation of renewable energy sources, and technical innovations that allow for low carbon emissions [162]. The MOE is advocating for the measurement of environmental costs arising from protecting the environment from industrial activities [163]. The MOE is also implementing natural capital accounting principles, on the basis of the idea that the natural environment is a type of capital that supports corporate management [163]. Although some companies are being evaluated in terms of their environmental costs, the health system will be evaluated, and the policies that should be implemented will be identified in the future [163].

8.2 Efforts to reduce the climate footprint in Japan's health system

Greenhouse gases, such as CO_2, methane, and nitrous oxide, increase global climate change. The amount of greenhouse gas emissions is referred to as the climate footprint.

Healthcare institutions are required to provide safe, stable, continuous medical services, thus resulting in poor energy efficiency. Consequently, efforts to reduce climate footprints and emissions will be important. The MHLW has formulated voluntary action plans for healthcare institutions in collaboration with the JMA and stipulated a 1.0% reduction target per year for reducing emissions of CO_2, the most common greenhouse gas. To achieve this goal, the MHLW has been promoting an energy transition from fuel oils and kerosene to electricity and gas and improving the heat-insulating properties of buildings undergoing renovation. The MHLW has also been promoting multiple energy conservation activities, with a particular focus on introducing high-efficiency equipment and reviewing air conditioning and lighting systems. Therefore, Japan has successfully reduced CO_2 emissions from healthcare institutions by 22.9% from 2006 levels by 2018, and continues to aim for a 25% reduction from 2006 levels by 2030 [164].

Furthermore, Japan is making progress in its efforts to reduce medical waste and emissions by-products. Medical waste, including biohazardous and non-biohazardous waste from Japan's healthcare institutions, is disposed of in accordance with the Waste Management and Public Cleansing Act [165]. Biohazardous waste is disposed of through methods such as incineration,

melting, sterilisation, or disinfection, described in the procedures for disposing of biohazardous waste [165]. In addition to creating and managing disposal plans, control procedures, and ledgers detailing disposal conditions, each healthcare institution is taking action to reduce the amount of waste incinerated by sorting medical waste [165]. However, incentives that could be implemented to reduce waste will require review.

The indirect healthcare climate footprint in the fields of nursing care, disease prevention, and transportation and sale of medicines is estimated to be approximately four times larger than the direct healthcare climate footprint, including CO_2, methane, and nitrous oxide emissions from healthcare institutions. Therefore, the overall (direct and indirect) healthcare climate footprint of the health system should be assessed [166]. In 2014, the overall healthcare climate footprint emitted by the health system in Japan accounted for 6.4% of that emitted from all industries, a value higher than the global average of 4.4%, thus leaving room for improvement [166]. The central government should set a target value for reducing the overall healthcare climate footprint emitted from the health system and should promote measuring and aggregating the footprint. The health system should also contribute to achieving carbon neutrality, wherein the total emissions greenhouse gases, including CO_2, is equal to the total absorption by forests, as well as other means of carbon removal. Technologies with low-carbon emissions and renewable energy must be introduced into the overall healthcare industry, including healthcare institutions, in collaboration with other industries.

8.3 Increasing health risks related to climate change

Global climate change stemming from greenhouse gas emissions has led to broader effects; thus, concerns have been raised regarding increasing health risks, including heat-related illness, malnutrition, mental health disorders, and the spread of infectious diseases. In Japan, the risk of heat-related illness and deaths has a serious, urgent, and specific impact on the health of residents [167]. Additionally, among infectious diseases, arthropod-borne infections, such as dengue fever, are considered serious and urgent threats [167]. The Intergovernmental Panel on Climate Change has projected that climate change may negatively affect the nutritional value of food and increase food prices, thus widening nutritional disparities; therefore, it is considering food system policies that promote appropriate food choices, and the reduction of food and industry waste [168].

Previously, countermeasures against global climate change have focused on mitigation measures aimed at reducing emissions of greenhouse gases that contribute to global climate change. However, these efforts have been inadequate in completely controlling the progression of global climate change. Therefore, adaptation measures to avoid and reduce the health losses of residents because of global climate change are now also considered important in Japan [169], [170]. For example, the central government supports local governments by forecasting potential emergency transport demand increases because of heatstroke [171] and issuing heatstroke alerts [172], thereby contributing to the resilience of Japan's health system. For infectious diseases transmitted through insects, such as mosquitoes and ticks (e.g., dengue fever and severe fever with thrombocytopenia syndrome), the central government is also taking action to monitor outbreak situations in endemic regions, control and eradicate pests, and provide health education at schools.

A co-benefit approach that simultaneously promotes both mitigation and health promotion measures is encouraged. Adoption of this approach is growing, particularly in Europe, because the costs of mitigation are justified by the benefits to health [173]. For example, if people use bicycles instead of motor vehicles, emission of greenhouse gases and air pollutants may decrease, and health may be improved by increasing cardiopulmonary activity. Eating less meat and more vegetables may decrease the energy consumed for feed production, and additionally may decrease transportation of livestock, the large amounts of methane and other greenhouse gases emitted from manure, and the generation of other wastes during the rearing process, while simultaneously improving human health.

8.4 The increasing health risks of, and regulations to curb, air pollution

Air population is a major factor contributing to rising health risks. For example, exposure to air pollutants such as fine particulate matter (PM2.5) may have adverse effects on cardiovascular and respiratory systems. The MOE has set environmental standards for emission values for air pollution particles and broadcasts accurate forecasts and alerts [174]. For PM2.5, the annual average must not exceed 15 μg/m^3, and the daily average must not exceed 35 μg/m^3 [174]. The ozone standard threshold for photochemical oxidants that are harmful to the throat and eyes has been exceeded at more than 90% of observation sites in Japan [175]. Furthermore, rising temperatures are associated with higher ozone pollution concentrations [175]. The central government is taking a stringent approach to regulating air pollution particle emissions, and emitters are required to observe emission standards for air pollution particles set out in the Air Pollution Control Act.

8.5 Sustainable use of genetic resources

The Convention on Biological Diversity has held discussions regarding the preservation of biological diversity, sustainable use of biological resources, and access to genetic resources and benefit sharing (ABS) arising from the use of genetic resources [176]. ABS is being discussed to advocate for the sustainable use of genetic resources globally [176]. Currently, the possibility that developing nations that possess genetic resources will not receive a fair share of the benefits derived from the resources, and that restrictions will be placed on using genetic resources from developing nations, is increasing. Companies in developed nations are using genetic resources from developing countries to develop and manufacture innovative pharmaceuticals, for example, using herbs for gene therapies, and have claimed intellectual property rights on these resources.

The ABS guideline aims to conserve and maintain genetic resources in the countries that possess them by granting these countries sovereign rights to their genetic resources. Preserving genetic resources is crucial for maintaining a stable supply of pharmaceuticals, such as aspirin and penicillin, that are created from genetic resources, including microorganisms, and animals and food from selectively bred crops. However, a global system should not over-protect the rights of the countries that have genetic resources, to allow such resources and information about them to be shared worldwide when needed. Because genetic resources include pathogens and viruses that cause pandemics, information and resources should be shared promptly during pandemics to prevent the global spread of infectious diseases.

The Cartagena Protocol on Biosafety aims to prevent the spreading of genetically modified organisms to the natural world and adversely affecting biodiversity. Signatory countries are obligated to inform importing countries when they export genetically modified organisms, and to either mitigate the risks or provide remediation for any harmful effects caused by these organisms in the importing country. However, the protocol is applied differently in Japan than in other countries. In Japan, because procedures for ministerial approval and confirmation take more time than in other countries, thus resulting in delays in introducing new healthcare technologies such as low-risk drugs, and hindering participation in global clinical trials, as indicated by industry [177, 178]. To promptly supply healthcare technologies that are genetically engineered and promote industry growth, the operation of the Cartagena Protocol on Biosafety must be reconsidered, to include internationally harmonising regulations on genetically modified organisms.

8.6 Promotion of planetary health

Planetary health refers to various organisms, including humans maintaining their lives in the earth's natural environment and safely engaging in organic activities. *The Lancet* has established the Planetary Health Commission to promote an understanding of how accelerated changes in the structure and functions of the earth's natural systems will affect human health, and advocate for

action in response to these changes. In the São Paulo Declaration on Planetary Health, people belonging to all communities in society, including healthcare professionals, are encouraged to take initiatives in achieving planetary health [179]. For example, all residents are recommended to be aware of protecting and restoring natural systems. Furthermore, healthcare professionals, who are faced with the health consequences of environmental degradation in residents, are encouraged to learn about planetary health concepts and values and to engage in advocacy activities [180]. As people's awareness of, and commitment to, environmental issues increase worldwide, scientific evidence regarding the environment and health should be strengthened in Japan.

The economic growth model could also be a threat to the resilience of health systems. For example, environmental degradation, such as deforestation of land use for human economic activities, has increased contact between humans and animals, and may contribute to outbreaks of new infectious diseases, as has been suggested in relation to the COVID-19 pandemic. Reviewing the future economic growth model will be important. To promote environmental conservation and peaceful social development, the United Nations Environment Program and WHO have advanced the One Health concept to prevent the spread of diseases common to both humans and animals, and establish connections between humans and animals, with a focus on long-term effects.

One of the most notable issues related to One Health worldwide, including in Japan, is the rise of AMR, which is also known as the silent pandemic. Following the adoption of a Global Action Plan on AMR by the WHO in 2015, at the 2016 Ise-Shima G7 Summit, hosted by Japan, AMR was firmly positioned as a common G7 issue, and was included as a major theme in the G7 Ise-Shima Vision for Global Health. In September of that year, AMR was further discussed at the G7 Kobe Health Ministers' Meeting, and was addressed as a global agenda item at the first-ever UN high-level meeting on AMR held at the UN General Assembly at the end of the month. In the same year, Japan formulated a 5-year National Action Plan (2016–2020) that included several targets to limit the use of antimicrobial compounds [181]. Despite substantial progress, most of the targets were not achieved by 2020. For fluoroquinolone, among the targeted antimicrobial compounds, the resistance rate of *Escherichia coli* is increasing. This problem, together with increases in methicillin-resistant *Staphylococcus aureus,* has been estimated to lead to 8,000 deaths due to AMR within Japan annually [182]. Notably, although many Action Plan targets have not been reached, efforts to achieve the targets could lead to over-control, which might hinder the promotion of appropriate use of antimicrobial agents. While the world is moving forward with AMR countermeasures, such as the launch of the One Health Global Leaders Group on AMR in 2020, with the WHO, the Food and Agriculture Organization of the United Nations, the World Organisation for Animal Health, and later the UN Environment Programme joining to form the secretariat, as of May 2022, Japan has not revised its national action plan. However, a revised action plan is expected to be prepared and implemented soon.

8.7 Recommendations

RECOMMENDATION 7A

Evaluate the environmental costs of the entire health system and promote appropriate responses

Sustainable environmental policies should be formulated. The central government should take the lead in evaluating environmental costs within the entire health system, including healthcare institutions, distribution, and waste. Initiatives with incentives should be promoted to encourage all stakeholders to measure their own environmental costs by using natural capital accounting.

RECOMMENDATION 7B

Set incentives and goals to reduce the health system's climate footprint

Goals should be set, and achievements should be measured and aggregated to reduce direct and indirect healthcare climate footprints for the entire health system, not just healthcare institutions.

The efforts of healthcare institutions to reuse/recycle healthcare resources and reduce climate footprints, including CO_2, should be strengthened by revising health insurance fees and subsidies to provide incentives.

RECOMMENDATION 7C

Implement and develop environmentally friendly technologies in cooperation with non-healthcare industries

Action should be taken to achieve carbon neutrality by developing healthcare technologies that use renewable energy, and low carbon emission systems, in collaboration with other industries. For example, environmental countermeasures should be promoted for the health system through CO_2 emission reductions from improved healthcare waste incinerator systems, promotion of energy conservation activities at healthcare institutions, and development of more environmentally friendly healthcare supplies.

RECOMMENDATION 7D

Promote co-benefits and adaptation measures for health problems caused by environmental degradation

The central government should prepare for an increase in the number of people with adverse effects on cardiovascular and respiratory systems because of air pollution particles, and a growing number of zoonotic diseases because of deforestation. The central government should also prepare for increases in infectious diseases, worsening mental health, malnutrition, and heatstroke, which may be caused by global climate change. To prepare for health risks related to environmental destruction, enhancing the R&D capabilities for healthcare technologies that could help solve these challenges, strengthening healthcare provision systems by securing the necessary healthcare resources, and formulating action plans should start immediately. Furthermore, public awareness and communication of adaptation measures should be strengthened, including the use of heatstroke alerts and co-benefit approaches, such as the promotion of bicycle commuting and shifting from meat-containing diets to vegetable-rich diets.

RECOMMENDATION 7E

Enhance international cooperation for the sustainable use of genetic resources

The central government should take the lead in promoting and encouraging the coordination of relevant regulations for the sustainable utilisation of genetic resources on a global scale, so that the benefits that arise from using these resources can be shared equally between developed and developing nations. Additionally, a system in which genetic resources and their information is shared globally should be created without over-protecting the rights of the countries that have genetic resources, by providing incentives to those countries.

RECOMMENDATION 7F

Enhance evidence development and awareness of environmental issues among the Japanese public regarding the promotion of planetary health

To raise awareness of environmental issues among residents and promote their efforts to improve the environment, the central government should take action to establish scientific evidence regarding environmental issues such as the climate footprints of industry sectors and the effectiveness of the co-benefit approach. Furthermore, this evidence should be shared with the public, and incentives and other measures should be used to encourage them to voluntarily implement environmental measures. Additionally, healthcare professionals, who will be treating the health consequences of environmental destruction, should be educated in planetary health and its values by inclusion of the concept and values in educational curricula, and should be encouraged to actively engage in advocacy activities.

9. CASE STUDY 1

A health system that can realise social inclusion in which no individual is left behind

Context

Although Japan is often considered to have achieved and maintained UHC, the country has been confronting many social issues in recent years, including a declining birth rate, an ageing population, rising poverty, social inequality, and social isolation. These social issues have arisen at a time when Japan is also undergoing a paradigm shift in its values and culture, such as the changes in lifestyles, increased employment of foreigners, and progress in ICT. These social changes have increased the number of socially vulnerable people and exacerbated the gap in health and well-being. If UHC is defined as a health system that provides healthcare services to every individual without exception, then Japan cannot yet claim to have achieved true UHC.

The COVID-19 pandemic has exposed deficiencies within Japan's UHC in its current form, particularly its limited ability to provide sufficient support to the poorest segments of the population. The economic damage caused by COVID-19 has highlighted that many people, including unemployed individuals, single parents, young carers, and foreign workers, are unable to achieve well-being and access healthcare because they are struggling with poverty. This problem reaffirms the importance of considering SDOH and realising social inclusion in a society in which no individual is left behind. As a global health leader, Japan will ideally find solutions for achieving social inclusion ahead of the rest of the world and use its experiences from the COVID-19 pandemic to construct a more sustainable and robust health system.

To address these problems, four strategies must be synergistically promoted: (1) the pursuit of well-being, (2) the promotion of positive health, (3) the promotion of social inclusion, and (4) the use of data and digital technology. The Japanese central government should build a society in which value-based, people-centred healthcare is provided to the entire population (leaving no one behind), using data and digital transformation, and empowering individuals to design their own healthier lives. This type of society has an inclusive architecture for better co-being, wherein all individuals are ensured equality and inclusion, and can realise diverse types of well-being throughout the course of their lives [1]. Japan should present this model for future health systems to the rest of the world.

Goal

To achieve better co-being, the central and local governments should identify challenges, identify people who need support, and provide economic and social support to them. Therefore, the central and local governments should consider the SDOH by establishing data infrastructure for medical, nursing care, and welfare services and employment, and creating an evaluation system.

Relevant domains

Domain 5: Service delivery

The case

In Japan, the central and local governments have implemented the following initiatives to improve physical and mental health management and achieve well-being among residents by considering SDOH:

- By creating the Digital Agency, the central government is promoting the formation of a digital society to achieve the well-being of residents. Data-based Health Management Initiatives have started building nationwide data infrastructure, popularising the My Number, and using data [4].
- To decrease health inequalities by supporting children living in poverty and single parents, the MHLW, Ministry of Education, Culture, Sports, Science and Technology, and Ministry of Internal Affairs and Communications are collaborating to promote policies and evaluation [183].

- Support is offered for healthcare, living expenses, and housing for low-income residents, such as non-regular employees and low-income families with children, on the basis of surveys related to SDOH and health risks [184].
- Healthcare must be provided with a high level of satisfaction for both patients and healthcare professionals, by considering patients' financial situation and disease severity. To address the gap in knowledge regarding health and healthcare between healthcare professionals and patients, both the central and local governments are promoting knowledge dissemination regarding treatment, diseases, and how to communicate with healthcare professionals to patients, and strengthening education in non-technical skills such as patient communication with healthcare professionals.

Analysis

By establishing the Digital Agency, Japan is driving the formation of a society that can achieve health and well-being that suits everyone. As a result of the Data-based Health Management Initiatives, the popularisation of My Number and the construction of a nationwide data infrastructure will progress, thus resulting in the realisation of a person-centred open platform for wellbeing [185]. This goal is one of the priorities of the Medical DX Promotion Headquarters (tentative name) that the Japanese government decided to establish on 7 June 2022. This platform will be built with an easy-access user interface, thus allowing the public to understand and use their healthcare information anywhere in the future. For example, residents will be able to view their healthcare information, such as health check-ups, detailed health insurance claim receipts, prescriptions, electronic records, and nursing care records. Furthermore, the information will be viewable by healthcare professionals in healthcare institutions, including nursing care facilities, to the extent that people give permission. Consequently, members of the public will be able to understand their own healthcare information throughout their lives, and simultaneously, optimal healthcare services in healthcare institutions can be provided according to the needs of residents.

The goal is to build a data infrastructure that consolidates health, welfare, and employment data, including private PHR data, by using open Application Programming Interfaces. Accomplishing this goal, by considering not only healthcare needs but also SDOH, including poverty, unemployment, single parenthood, and young carers, would enable all challenges faced by residents to be identified and residents to be referred to support. A culture of using data must be established to rapidly determine policies, share data, and perform data-driven policy evaluations by removing the barrier between government ministries and departments.

By providing healthcare services consistent with residents' values, residents' compliance regarding disease prevention, treatment, and nursing care would increase. Provision of suitable healthcare services would also improve satisfaction among both residents and healthcare professionals, including medical professionals and caregivers who provide healthcare services. Therefore, healthcare institutions, the central and local governments, and businesses such as pharmaceutical companies must proactively promote knowledge among residents regarding managing health, diseases, treatment methods, and pharmaceuticals, as well as communicating with physicians. Additionally, governments, employers, and local communities should take the lead in creating a society in which residents have easy access to healthcare services. For example, by creating a social environment that makes it easy to receive healthcare during regular weekday hours, residents can visit healthcare institutions in a timely and convenient manner, and receive the services they need. This initiative would also reduce the overtime and off-hours work for healthcare professionals, thereby promoting their sustainable workstyle and increasing medical safety. In fact, actions are already being taken to increase awareness of the importance of reforming the structure of society overall by patient organisations working with the central and local governments.

Recommendations

5E Promote policies that consider SDOH to reduce inequalities in healthcare

1A Develop a strong data-driven culture, and make data the universal basis for policy decision-making

1G Promote health data use by developing health data infrastructure and publicising data

3D Promote patient-centric healthcare, and educate healthcare professionals to support positive health

4D Develop a health information technology architecture wherein various health records are linked on an individual basis and shared nationwide

Limitations

There are several limitations to building a society with better co-being. Challenges exist regarding building data infrastructure nationwide, including (1) the high cost of introducing devices such as smartphones or accessing these services or applications, (2) the time required to unify, expand, and clear regulations for private and public services, (3) the difficulty in accessing ICT among individuals with mental and physical limitations, and (4) the difficulty in protecting privacy with security management regarding personal information [102].

10. CASE STUDY 2

A social system that supports positive health throughout the life course

Context

Because Japan is facing a declining birth rate and an increasingly ageing society ahead of the rest of the world, the sustainability and resilience of its healthcare system is under threat, owing to a growing demand for healthcare due to an increase in the number of older adults with multiple diseases, coupled with a shortage of labour because of a decrease in the working population. Under these circumstances, positive health is the key to averting crises in the health system. Positive health promotes active management and development of one's own health and well-being, and independently responding to physical, mental, and social challenges instead of passively receiving healthcare services from the system [87]. To achieve positive health, people are encouraged to pursue an empowered lifestyle. Individuals must educate themselves regarding health and medicine and be aware of their own health (including judging whether their health is good or poor) and the most suitable treatments. This framework would enable people to have more constructive discussions with healthcare workers; be actively involved in prevention and treatment decision-making; and identify individual health and well-being goals tailored to their social status, values, and lifestyles. With increasing health risks related to chronic diseases, including NCDs, Japan is undergoing a paradigm shift towards values and a culture that encourages the public to independently manage their own health and well-being and respect the diversity of lifestyles. The concept of positive health must be popularised among residents, and a social system that supports the achievement of their proactive health and well-being management throughout the life course must be built.

Goal

To build a social system that supports resident positive health throughout the life course, the central and local governments have led initiatives to (1) promote the prevention of NCDs, which continue to increase, (2) support nursing care for the older adults, and (3) promote independent health management by individuals.

Relevant domains

Domain 6: Population health and health promotion

The case

The central and local governments implemented the following three initiatives, which are examples of efforts to build a social system for positive health throughout the life course:

1. Efforts to guide the vision for the health condition of residents

- In Kanagawa prefecture, industries and universities cooperated with the WHO in creating an index to measure the ways of thinking and actions taken regarding ME-BYO, an intermediate state between health and disease, wherein health and disease are on a continuum, and dichotomous thinking about health and disease is rejected. The prefecture is pioneering efforts to improve health by, for example, using a smartphone app that allows residents to understand their own health conditions [186].
- In the Hirosaki University Center of Healthy Ageing Innovation (COI Program) and the Hisayama-Town Research Program, local governments have worked with local universities to conduct a survey regarding the health conditions and health-related issues of residents. On the basis of the results of the survey, local governments are taking action to improve health, including providing health guidance [187, 188].

2. Efforts to support nursing care for older adults

- The central government introduced the LTCI system and provides extensive facility-based care with service-dependent costing (e.g., physical care such as preparing meals, rehabilitation, excretion care, and recreation) [21, 23].
- Livelihood support (such as cooking, washing and cleaning, consultation, and advice on daily life) oriented towards self-sufficiency and user-centred support, is being promoted with the CICS that links nursing care and other healthcare services [10].
- In support of non-pharmaceutical intervention, Obu City in Aichi Prefecture is promoting city development that promotes healthy longevity, curbs the development of dementia, and is easy to live in for people with dementia [189].

3. Efforts to promote independent health management by the public

- To popularise the concept of life design, wherein people independently participate in the management of their own health and design their lives, local governments are proactively planning and providing opportunities for people to become healthy in fun ways, by using smartphone apps and wearable devices [149].

Analysis

Positive health encourages people to consider and set their own health and well-being goals, which are suited to their lifestyle, ideology, socio-economic condition, and work style [87]. Even if someone is physically healthy, a lack of well-being can detract from an individual's life, and even if someone is physically unhealthy, the individual's life can benefit if well-being is achieved. Japan's health policies, which have been aimed at achieving physical health, must change to encourage positive health. When people set their own goals for health and well-being, and independently take action to achieve their goals, their dependence on healthcare services is reduced. This effort in turn improves the sustainability and resilience of the healthcare system.

The central and local governments should take the lead in providing healthcare, including medical, nursing care, and welfare services, to support members of the public independently managing their health in their preferred ways. As the population is rapidly ageing, demand is increasing for healthcare services that can manage chronic diseases, and prevent or manage NCDs that can lead to disabilities. To meet this increasing demand, more funding, a strong commitment from the central and local governments, accountability based on evidence generated from better quality data, and cooperative efforts to prioritise people in the weakest positions in society are required [145]. To allocate limited resources with appropriate priorities, investments in health research may need to be aligned with public health needs on the basis of DALYs, a comprehensive health index reflecting population ageing and public health needs. After identification of important risk factors for diseases, such as NCDs, that increase the disease burden, efficient policy interventions for people with health risks must be implemented. Finally, promoting preventive measures will be important, including incentivised behaviour changes, early health education for children, and health guidance to residents using IoT technologies.

The Japanese central government has been promoting the CICS since 2006 to manage social care for the rapidly ageing population. This system allows older adults to have an appropriate local living environment and social care; access to livelihood support services; and integrated healthcare services, including preventive care, medical care, and nursing care available within 30 minutes. This framework could set a precedent for Asian countries with ageing populations. However, future challenges will include strengthening cooperation between social care and healthcare providers, clarifying the division of their responsibilities, and reducing the care burden on families of older adults.

As a social system is being built to support resident independently managing their own health, increased use of ICT technologies, such as smartphone applications and wearable devices, is expected to provide people with opportunities to become healthy in fun ways. However, disparities in health awareness and generational differences regarding digital literacy and accessibility for individuals with disabilities will be barriers to widely popularising health management and healthcare services using digital tools [102]. Policies to manage the effects of the digital divide on residents have not been established. Therefore, central and local governments should promote digital literacy by providing opportunities for health and digital education in various places, including childcare and early childhood education facilities, workplaces, and communities. Furthermore, support for people with disabilities in using ICT should be developed and provided urgently.

Recommendations

- 6B Promote allocation of resources for research and activities that are data driven and in line with public health needs
- 6C Intervene to reduce major risk factors of NCDs
- 5D Support health promotion and reimagine healthcare as a social system that allows individuals to make independent decisions regarding their health and life choices

Limitations

Building a social system that supports the public's achieving positive health throughout the life course is an important challenge not only for Japan but also for other countries. However, several limitations exist. Similarly to the limitations in Case study 1, progress in using digital technology and addressing the digital divide has varied among regions. Progress in implementing systems among socially support older adults, such as LTCI and CICS, has also been slow in regions with aging and depopulated populations, and weak transportation infrastructure.

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