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Developing a National Health and Climate Strategy for Japan

Recommendations for Building a Climate Resilient, Decarbonized Health System

Health and Global Policy Institute

HGPI Health and Global Policy Institute

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Executive summary

Climate change is the single most important public health challenge of the 21st century. The term “climate change” refers to the long-term changes in temperature and weather patterns that are the clear result of greenhouse gas (GHG) emissions associated with human activities. By 2023, there was an observed increase in annual mean temperature of more than 1.5°C above pre-industrial levels. Effects associated with this change to the earth’s environment including increased frequency of droughts, biodiversity loss, ocean acidification, and food shortages have severe impacts on all life on Earth. Actions for climate change have been the subject of active global-level discussions in recent years at forums including the United Nations Framework Convention on Climate Change and the G7, but if even further efforts to reduce GHG emissions are not taken, then by the end of this century, a wide range of natural ecosystems including those in terrestrial, freshwater, and coastal and open ocean areas will be placed at very high risk of serious and irreversible and impacts on a global scale.

Climate change is also a threat to human health. In addition to greater damage to infrastructure and other assets due to increased frequency and intensity of climate disasters such as heat waves, torrential rains, droughts, and tropical cyclones, around the world, climate change will cause or is expected to cause worsening sanitary conditions and food insecurity due to difficulties in securing water for domestic use while reducing crop yields and increasing water, food, and arthropod-borne diseases. Climate change may also aggravate mental health conditions and force more people to become climate refugees. In addition to approximately 250,000 additional deaths per year, there are also concerns that climate change will lead to political instability and violent armed internal conflicts. Health hazards are likely to be particularly severe in the Global South. Japan may experience a number of effects, as well. Greater heat stress from rising temperatures is likely to increase the risk of various diseases, starting with heat stroke and other heat-related illnesses. Rising temperatures may also change endemic regions and patterns of spread for arthropod-borne diseases, while changes in ambient temperatures may alter prevalence patterns for water- and food-borne diseases and infectious diseases such as influenza. It has been pointed out that these health threats are likely to disproportionately affect elderly people, people living with chronic diseases, and other vulnerable groups.

However, the healthcare sector is a major GHG emitter that accounts for 5% of all CO_2 emissions. Factors like global population aging, growing prevalence of chronic non-communicable diseases, and urbanization all contribute to increased healthcare demand, so it is unrealistic to expect the amount of GHG emitted by the health sector to decrease on its own. To strongly promote efforts to address climate change though GHG reductions, it will be essential to set the clear goal of establishing a health system that is net-zero GHG emissions through the supply chain and to provide a roadmap to carbon neutrality by 2050.

Active discussions on transitioning to green health systems are currently being held at the global level. Ongoing initiatives such as the Alliance for Transformative Action on Climate and Health (ATACH) from the United Nations and the World Health Organization (WHO) aim to create climate resilient, low carbon, sustainable health systems and to address the environmental impacts of supply chains. The Government of Japan expressed interest in ATACH at the WHO Executive Board meeting in January 2024, but has not yet formally joined. Of the G7 members, only Japan and Italy have yet to join ATACH. As CO_2 emissions from Japan's health system are high by global standards, it may be safe to say that in the transition to green health systems, Japan is being left behind.

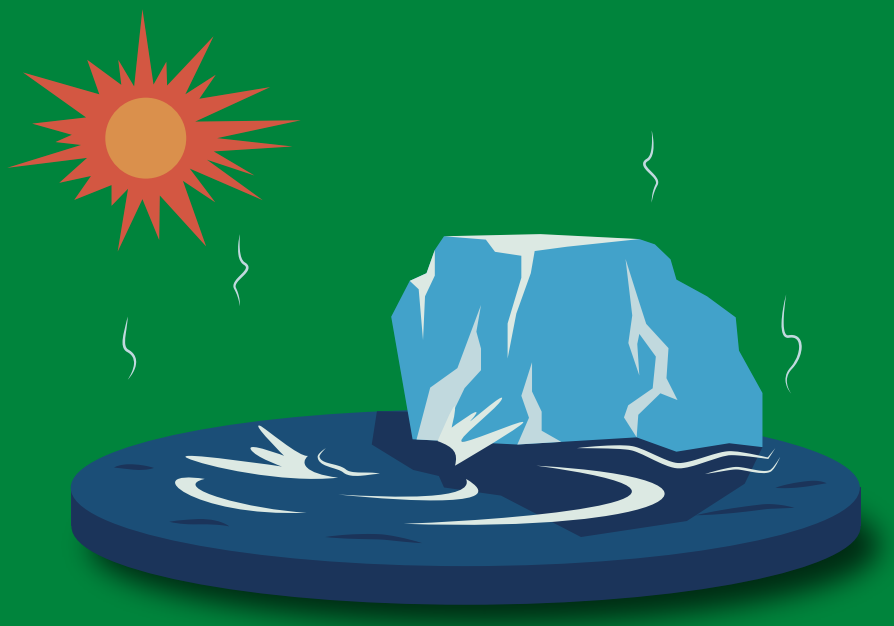
In light of these circumstances, the purpose of these recommendations is to help Japan formulate a national health and climate strategy for a more climate resilient, decarbonized, and sustainable health system. In addition to efforts from the Ministry of Health, Labour and Welfare (MHLW) and the entire Government, meeting this challenge will require that we cooperate and collaborate with related organizations and other countries to share scientific expertise and develop international standards. Building a climate-resilient, decarbonized, and sustainable health system will protect the health and improve the well-being of the people of Japan, and decarbonization will allow us to seek substantial solutions to the problem of climate change.

We have sorted the necessary actions into adaptation actions, which reduce negative impacts by adjusting ecological, social, and economic systems, and mitigation actions, which focus on reducing GHG emissions. Addressing climate change will require parallel progress in both adaptation and mitigation, so for each, we conducted a critical appraisal of existing measures, identified issues, and compiled discussion points. These recommendations then identify measures that should be implemented based on five principles: the concept of planetary health, in which the health of the planet and the health of people or human society are considered to be interrelated; the perspective that emphasizes protecting populations; evidence-based policymaking (EBPM); ensuring opportunities for good health; and harmonizing with the traditional view of nature in Japanese culture. Adaptation measures include evaluating climate vulnerability, establishing an integrated surveillance system that is linked to climate information, and reinforcing disaster preparedness with an increase in climate disasters in mind. Mitigation measures include establishing methods to measure the carbon footprint of the health system, identifying specific emission sources and formulating mitigation measures, and raising awareness among stakeholders. We then present three essential elements for strong progress on these policies: all of government leadership and governance, providing education and capacity building to healthcare professionals, and promoting research activities.

It is our sincere hope that these recommendations will serve as a catalyst for moving Japan's health sector a step forward in addressing climate change.

1

Introduction



I Introduction

1. Objectives of these recommendations

These recommendations have four objectives, described below.

The first objective is to strongly encourage health sector climate measures by raising awareness among stakeholders including the national Government, local governments, the health sector, and health professionals. It is difficult to say that there is sufficient recognition of climate change as a major public health issue in Japan. To address this, we reviewed the current and worsening situation surrounding climate change, existing assessments on and future projections for the health impacts of climate change, and global trends in health system responses. After identifying potential severe future health impacts of climate change on all life on Earth, including humanity and health systems, we outline global initiatives that are currently underway. Based on these circumstances, we contend that it will be vital for Japan to strongly promote climate change measures in the health sector.

Second, we argue that formulating a national strategy with adaptation measures focused on the health sector and promoting the creation of a climate-resilient health system will be essential for maintaining and improving the health of the people living in Japan. For this purpose, we conducted a comprehensive and critical examination of current adaptation measures for climate change (such as impact assessments and adaptation plans) to identify fields and areas where measures for climate-associated health risks are inadequate. We then recommend necessary policy measures that include conducting climate vulnerability assessments at every appropriate level (including the national level, at local public bodies, and at health institutions) to examine options based on those assessments; establishing an integrated surveillance system that links heat-related and infectious disease surveillance and climate data; and reinforcing preparedness for weather-related disasters.

Our third objective will be to discuss the need to advance efforts to decarbonize the health system as soon as possible. As GHG emissions

are the cause of climate change and the health system accounts for a large share of emissions, decarbonizing the health system will be an essential step in addressing this problem. We will examine policy steps that should be taken by health sector stakeholders such as the government, local public bodies, health institutions, healthcare professionals, and patients to decarbonize the health system and meet the Government's goal of carbon neutrality by 2050. Items covered in these recommendations include establishing methods of measuring GHG emissions, identifying emission sources that require mitigation, and specific mitigation measures.

Finally, cross-cutting action spanning multiple areas will be an absolute necessity for robust progress in the policies described above. Rather than leaving all climate action in the hands of a single ministry or agency, multiple ministries and agencies, related administrative bodies, health institutions, the private sector, research institutes, and other parties must work together closely to synthesize scientific findings into policy. Below, we discuss the leadership and governance, capacity building for healthcare professionals, and research promotion that will be necessary to provide this dynamic transformation with powerful backing.

Box 1.

Changes in the global climate and the arrival of the Anthropocene

The impacts of global climate change on human health and society are growing more severe by the day. Major changes in the global environment began with the Industrial Revolution, which started in the United Kingdom in the mid-1800s. Factors such as climate change, biodiversity loss, deforestation, chemical pollution of the environment, and the emergence of novel infectious diseases have significantly reduced the resilience of the global climate system and revealed its vulnerability.

The name "Anthropocene" was proposed in 2000 to describe the new geologic age in which humanity has begun to impact the climate and ecosystems of the Earth. This concept has become widely recognized as a symbol of social, economic, and cultural change.*1

Two concepts provide specific signs that the Anthropocene has arrived: the Great Acceleration and the Planetary Boundaries.*2 The Great Acceleration refers to the drastic worsening of global climate systems (including atmospheric GHG concentration, stratospheric ozone levels, surface temperatures, ocean pH levels, fish catches, eutrophication, tropical rainforests, and terrestrial biospheres) due to increasing burdens placed on them that have accompanied growing economic activity over the 250 years since the Industrial Revolution, especially in the years since the end of World War II.*3 The Planetary Boundaries are an objective assessment of the scope in which the health of the global climate systems can be maintained. In other words, they describe the upper limits of the global environment in which humans can thrive.*4 These boundaries mark limits at which the risk of large, abrupt, and irreversible environmental change increases in nine areas including climate change, biosphere integrity, land-system change, biogeochemical flows (phosphorus and nitrogen cycles), ocean acidification, atmospheric aerosol loading, and stratospheric ozone depletion. A paper published in September 2023 mapped out all nine boundaries for the first time and discovered six have already been crossed: climate change, biosphere integrity, land-system change, biogeochemical flows, novel entities, and freshwater use (see Figure I-1).

In addition to the Planetary Boundaries, boundaries in which perspectives based on social science and on the community level called the Earth System Boundaries were presented in Nature in May 2023 (see Figure I-2).*5 This perspective encompasses the planetary health impacts on all life on Earth, including human beings, due to climate change and environmental change caused by human activities. It is precisely this perspective that we must be aware of in order to play a key role in creating a sustainable future together with the international community.

Understanding the concept of the Anthropocene and its underlying events is an important step when interpreting the interrelated nature of climate change and health.

*1 Crutzen PJ. (2002). Geology of mankind. Nature. Jan 3;415(6867):23.

*2 Global Change and the Earth System (2004) http://www.igbp.net/download/18.56b5e28e137d8d8c09380001694/1376383141875/SpringerIGBPSynthesisSteffenetal2004_web.pdf

*3 Steffen, Will, et al. "Planetary boundaries: Guiding human development on a changing planet." Science 347.6223 (2015): 1259855.

*4 Richardson, K., Steffen, W., Lucht, W., Bendtsen, J., Cornell, S. E., Donges, J. F., ... & Rockström, J. (2023). Earth beyond six of nine planetary boundaries. Science advances, 9(37), eadh2458.

*5 Rockström, J., Gupta, J., Qin, D., Lade, S. J., Abrams, J. F., Andersen, L. S., ... & Zhang, X. (2023). Safe and just Earth system boundaries. Nature, 1-10.

Figure I -1 The Planetary Boundaries*6

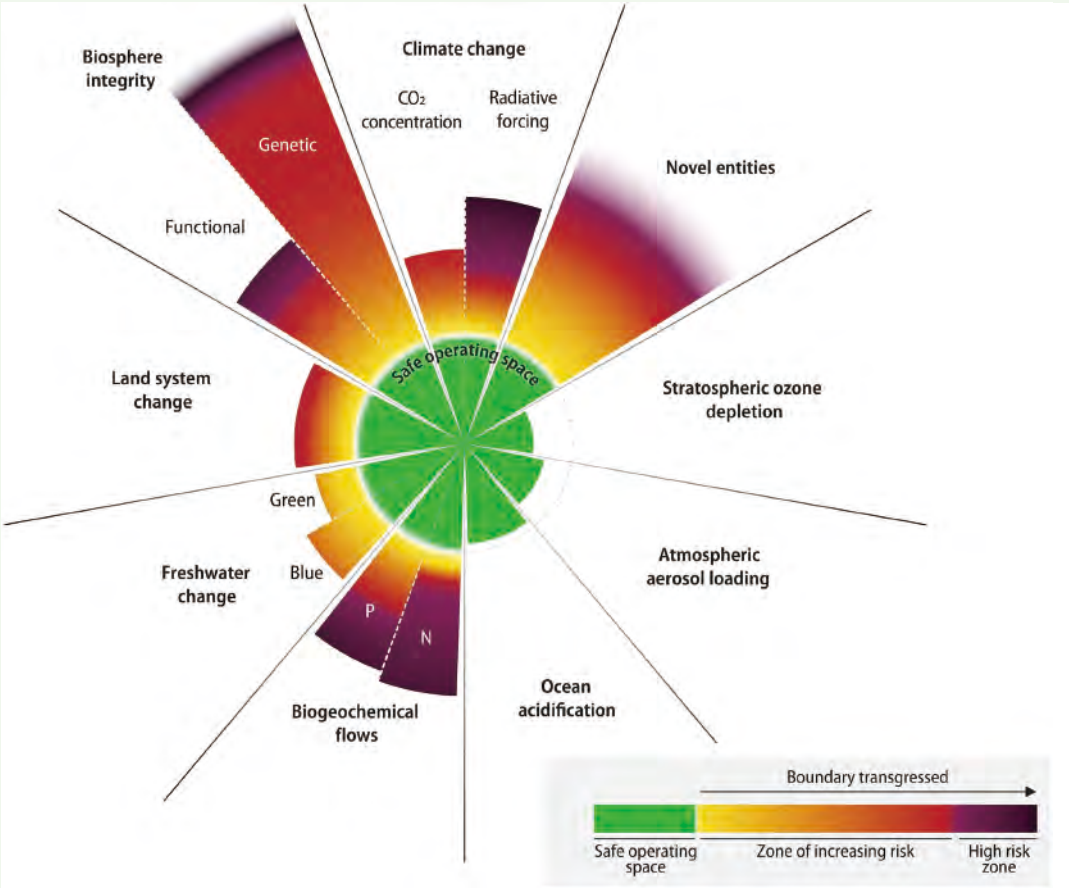
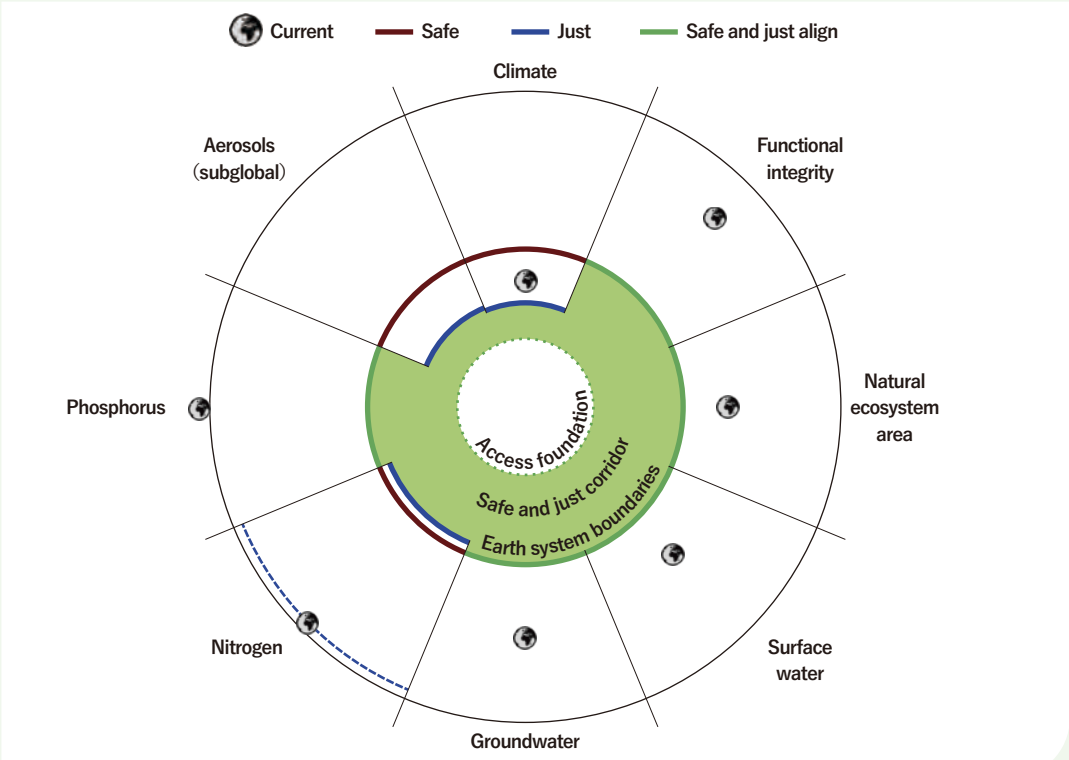


Figure I -2
The Earth System Boundaries



*6 See footnote 4.

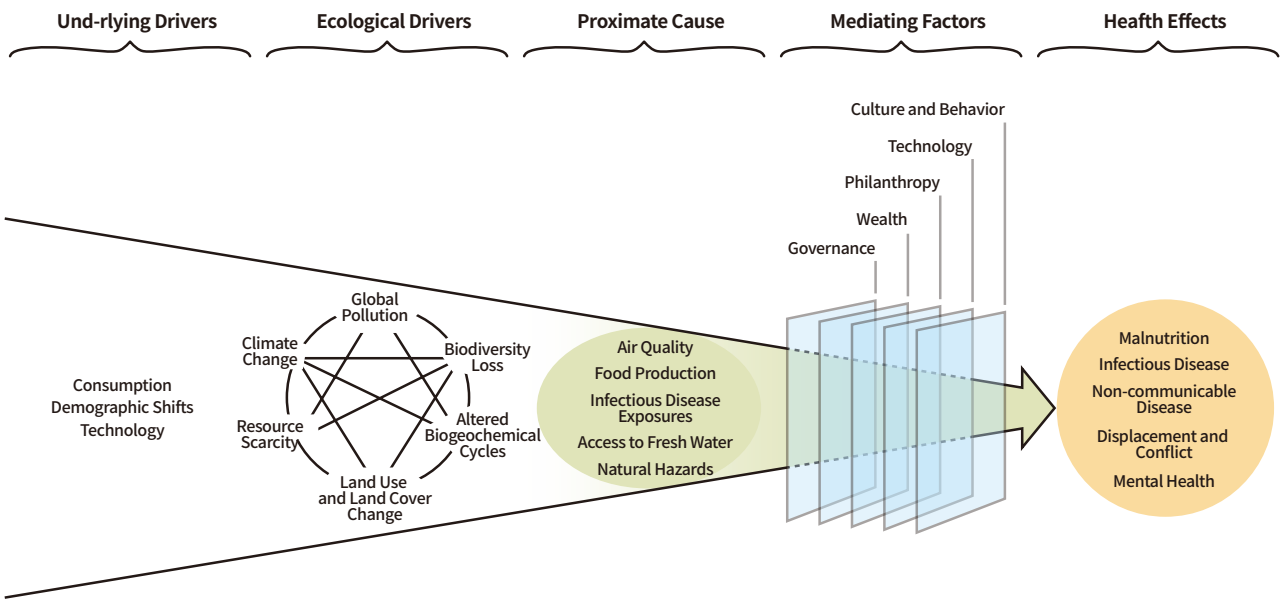
Box 2.

The concepts of planetary health

Planetary health is a concept proposed in The Lancet in 2015 that uses a transdisciplinary approach in which the health of the planet and its ecosystems are integrated with the health of people and human society (see Figure I-3).*7 This concept draws upon expertise from a diverse range of disciplines such as public health, environmental science, geography, agriculture, economics, and political science to identify ways in which the health of life on Earth and the environment which upholds human wellbeing are interdependent, with the aim of achieving a sustainable future.

Planetary health addresses a wide range of issues. These include biodiversity loss, deforestation, chemical pollution of the environment, the emergence of zoonotic infectious diseases, and the destabilization of living systems that leads to climate-caused migration. Because climate change in particular has an enormous impact on human health, elucidating and mitigating its effects is a key area in planetary health. It includes both research and practical activities that aim to identify the impacts of GHG-driven climate change on humanity as well as to minimize undesirable effects.

Figure I -3 Planetary Health Conceptual Diagram



*7 Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., de Souza Dias, B. F., ... & Yach, D. (2015). Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health. The lancet, 386(10007), 1973-2028.

2. The urgency and severity of climate change

Among the nine areas described above (Figure I-1), climate change—which is sometimes referred to as a "climate crisis" or "climate emergency"*8 —is a particularly urgent and critical issue that we cannot avoid addressing. The severe impacts of climate change will not only affect ecosystems and human health, but all life on Earth. It is for this reason that these recommendations focus on addressing climate change.

Compared to the 1850-1900 baseline, the average global surface temperature for 2011-2020 was estimated to be 1.1°C warmer. We are already experiencing dire effects from global warming associated with the climate crisis. Changes observed around the world include hotter average temperatures, melting of snow and ice, and rising sea levels. Due largely to changes in precipitation and drier weather, there have also been reports of more frequent and longer wildfires and coral bleaching. These changes will lead to more natural disasters, greater damage from typhoons, and anxiety over shortages of drinking water and food. There are also concerns that climate change will force more people to become climate refugees and cause political instability or armed conflict.

From February 2023 to January 2024, average temperatures increased by 1.5°C, which is called the "tipping point" – a limit that will result in a number of cascading, irreversible impacts.*9 It has been reported that climate-related risks for health, livelihoods, food security, water sharing, and economic growth are increasing and that climate security is being threatened. If global warming levels reach 1.5°C, up to 14% of the tens of thousands of species on Earth will be at risk of extinction.*10 On every continent and in every ocean, climate change is affecting ecosystems and communities. Even if we take the right actions to combat climate change, it has been demonstrated that failure to introduce even further efforts to reduce GHG emissions will result in high to very high risk that warming will result in severe, widespread, and irreversible global impacts by the end of the 21st century. As a broad scope of weather-related disasters continue to occur in every region, existing actions to mitigate the impact of these incidents are insufficient. Limiting the rise in temperatures will require strong, urgent action at the global level.

3. The relationship between GHG emissions from fossil fuel combustion and climate change

According to the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6), it is unequivocal that the primary driver of global warming is GHG emissions from human activities.*11 The AR6 also states that the combustion of fossil fuels (including coal fired power generation) and industrial processes are the main sources of GHG emissions.

Since the Industrial Revolution began around 1750 and transformed human socioeconomic activities, there have been rising atmospheric concentrations of GHGs such as carbon dioxide (CO_2), methane (CH4), nitrous oxide (N_2O), and halocarbons (See Figure I-4). The concentration of atmospheric CO_2 has risen from 335 parts per million (ppm) in 1979 to 421 ppm in 2023. Methane concentration has increased from 1650 ppb (parts per billion) since the record began in 1983 to 1927 ppb in 2023. As for nitrous oxide, the atmospheric concentration increased from 316 ppb in 2001 to 336 ppb in 2023.*12 Atmospheric concentrations for methane and nitrous oxide have reached levels that were previously unseen in the past 800,000 years, while the concentration of CO_2 is higher than any other point in the past 2 million years. The increase in the concentrations of these GHGs since 1750 is beyond the range of natural levels that occurred over the thousands of years between glacial and interglacial periods in the past 800,000 years.

Halocarbons are carbon compounds with halogen molecules and most are highly potent GHGs. Halocarbons are believed to cause ozone layer depletion and their atmospheric concentrations have trending downwards since their production was regulated with the signing of the Montreal Protocol in 1989 and the adoption of the Kigali

*8 Archer, D., & Rahmstorf, S. (2010). The climate crisis: An introductory guide to climate change. Cambridge University Press.

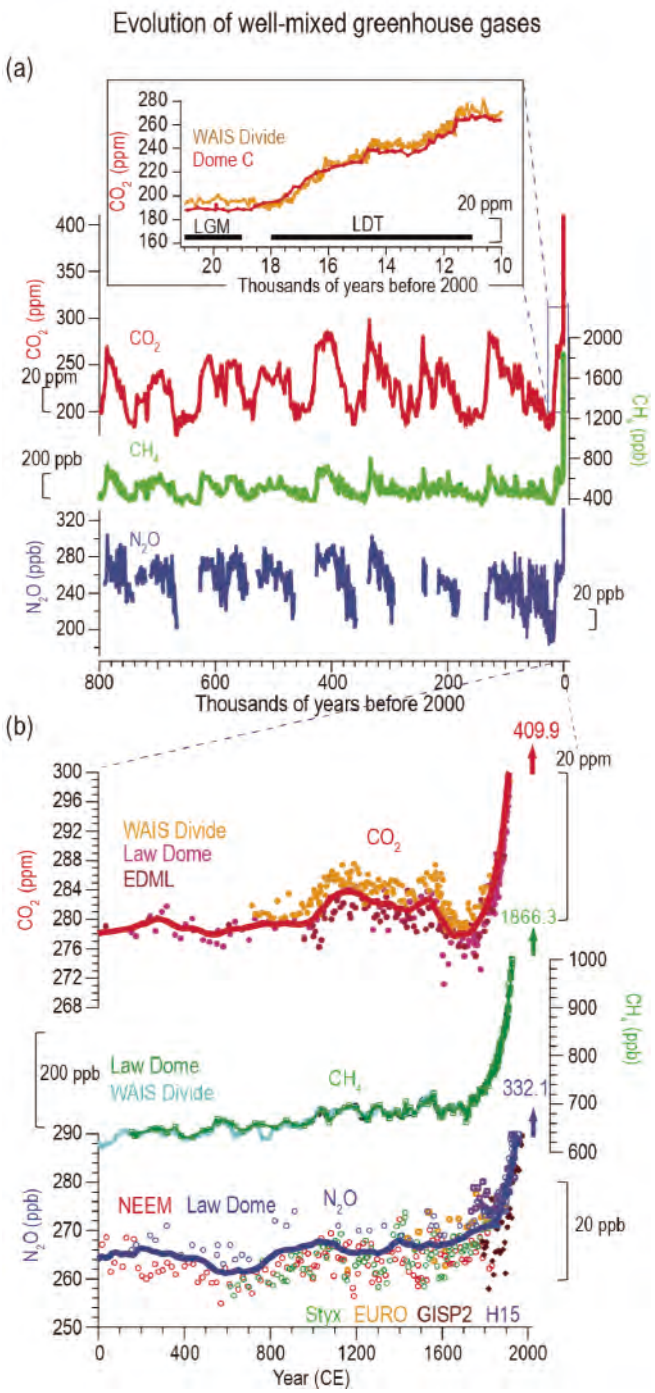
*9 Armstrong McKay, D. I., Staal, A., Abrams, J. F., Winkelmann, R., Sakschewski, B., Loriani, S., ... & Lenton, T. M. (2022). Exceeding 1.5 C global warming could trigger multiple climate tipping points. Science, 377(6611), eabn7950. https://doi.org/10.1126/science.abn7950.

*10 IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647.

*11 See footnote 10.

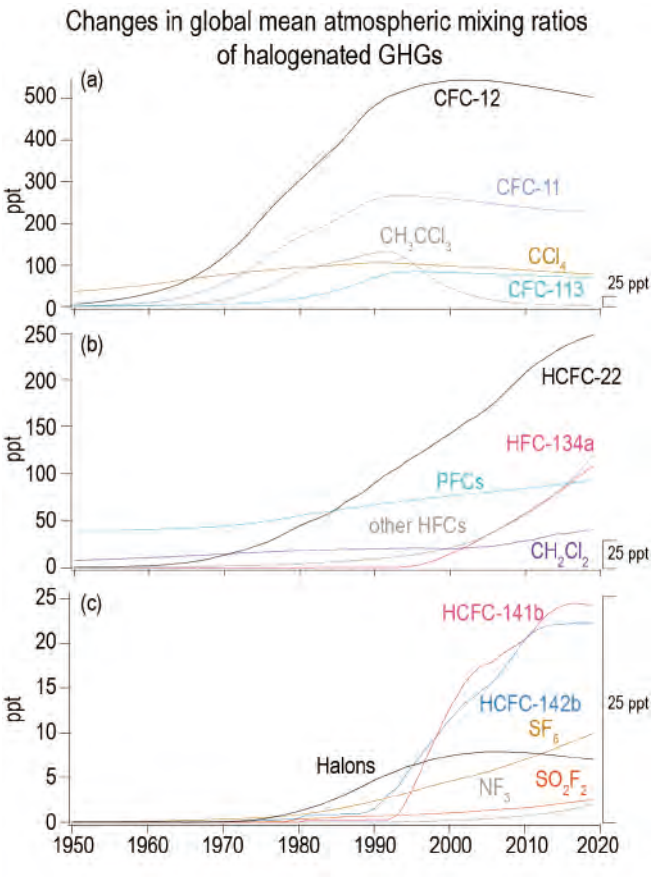
*12 Greenhouse Gas Equivalencies Calculator | US EPA. (n.d.). Environmental Protection Agency. Retrieved March 9, 2024, from https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

Figure I -4 Atmospheric concentrations of GHGs over time (CO_2: carbon dioxide, N_2O: nitrous oxide, CH_4: methane)



Amendment at the 28th Meeting of the Parties to the Montreal Protocol in 2016.*13 While the Montreal Protocol also regulates the production of hydrochlorofluorocarbons (HFCs), their atmospheric concentrations are still increasing (See Figure I-5).

Figure I -5 Global mean atmospheric concentrations of halogenated GHGs*14

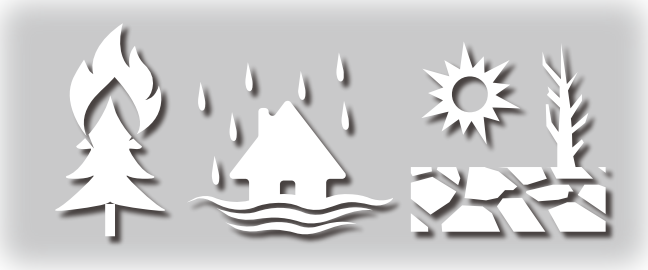


*13 Ministry of Land, Infrastructure, Transport and Tourism (MLIT). GHG Web Science Museum. Japan Meteorological Agency; Exhibit Room 1: Basics on Greenhouse Gases (jma.go.jp).

*14 IPCC, 2021: Chapter 2. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Gulev, S.K., P.W. Thorne, J. Ahn, F.J. Dentener, C.M. Domingues, S. Gerland, D. Gong, D.S. Kaufman, H.C. Nnamchi, J. Quaas, J.A. Rivera, S. Sathyendranath, S.L. Smith, B. Trewin, K. von Schuckmann, and R.S. Vose, 2021: Changing State of the Climate System. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 287–422, doi: 10.1017/9781009157896.004 .

4. The health impacts of climate change

The health impacts of climate change are diverse and complex. They can be broadly classified into three categories, described below (See Figure I-6 and Table I-1).



1) Direct pathways

The direct impacts of climate change are described below.

- **Health harms associated with extreme weather events: Extreme weather events cause heat waves, floods, storms, and wildfires to occur more frequently and with greater intensity. In addition to increased mortality from heat-related illnesses, trauma, drowning, and respiratory illnesses, such events also result in mental health conditions such as Post-Traumatic Stress Disorder (PTSD). These health harms also include those resulting from the destruction of infrastructure due to disasters.**
- **In addition to heat-related illnesses, long-term changes caused by heat can aggravate symptoms or increase mortality of existing chronic diseases, particularly cardiovascular diseases (CVDs) and respiratory diseases.**

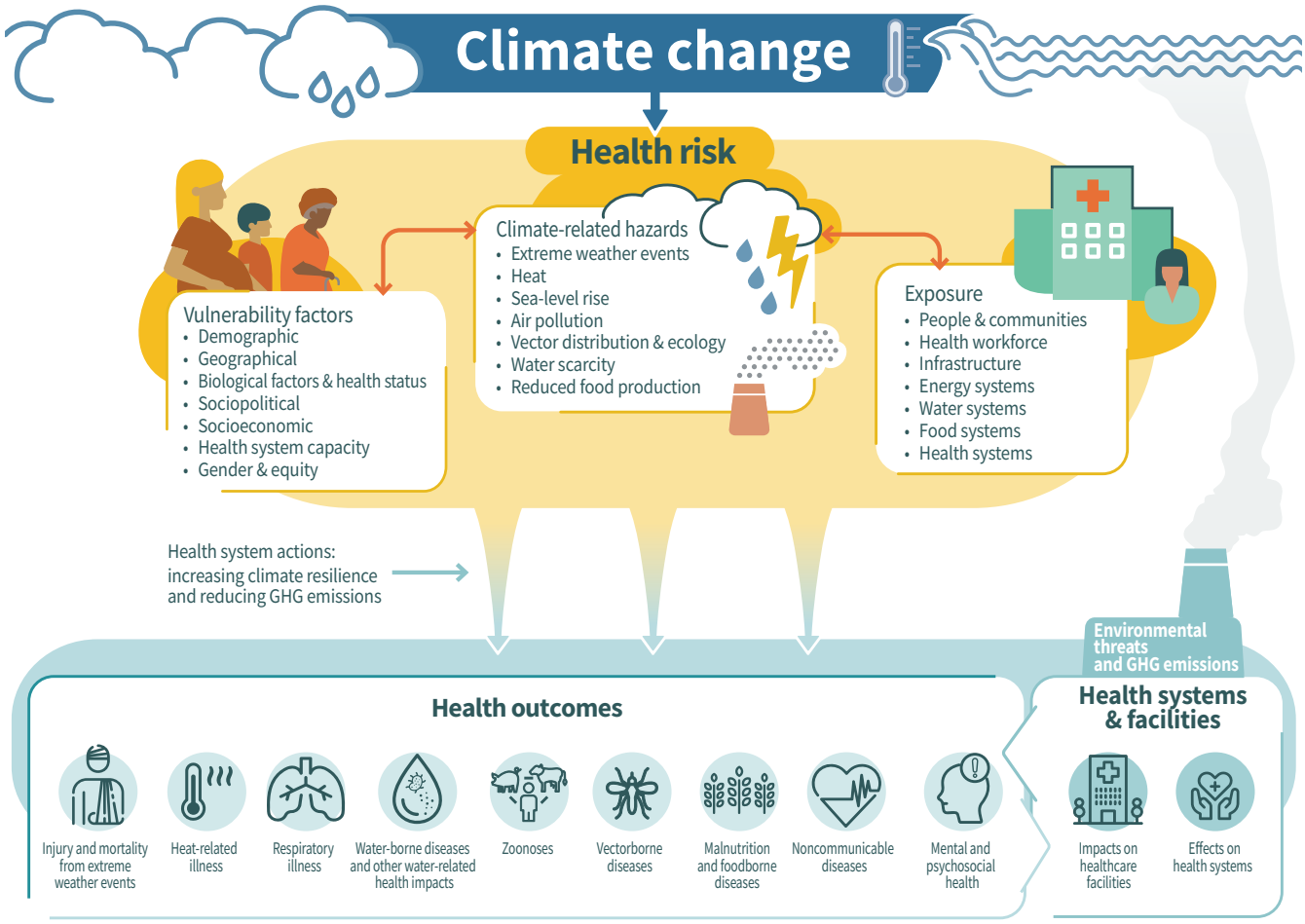
2) Indirect pathways

Indirect pathways include the following items.

- **Loss of glaciers and ice sheets will make obtaining fresh water difficult. This will cause problems in securing water for domestic and agricultural use as well as lead to concerns over sanitation and food security.**
- **Reduced crop yields will result in new food insecurity and exacerbate existing food insecurity.**
- **Expanded geographic distribution of mosquitoes, ticks, and other vectors will increase water- and foodborne infectious diseases and expand endemic areas for arthropod-borne infectious diseases.**
- **Existing respiratory diseases will worsen due to air pollution caused by environmental deterioration. Forced changes to food, clothing, and shelter due to environmental factors are causing mental health problems to worsen and may impact other issues, such as suicide.**

Projections show that continued economic growth without adequate measures to control GHG emissions will cause approximately 250,000 additional yearly deaths from 2030 to 2050.*[15] People in developed countries are expected to face greater risk of heat-related deaths, especially senior citizens, while those living in parts of the Global South such as the sub-Saharan region of Africa or South Asia will experience greater mortality risk from child malnutrition, malaria, and diarrhea. Health hazards are expected to be much more severe in the Global South, and climate change hazards in the Global South are now the subject of global concern.*[16]

Figure I -6 Direct and indirect health impacts of climate change



*15 World Health Organization. (2014). Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. World Health Organization (WHO). Retrieved March 18, 2024, from https://www.who.int/publications/i/item/9789241507691.

*16 Cabinet Secretariat. (October 17, 2023). Meeting to Promote Cooperation with Global South Countries. Cabinet Secretariat Homepage. Retrieved March 18, 2024, from https://www.cas.go.jp/jp/seisaku/global_south/index.html.

Table I -1 Physical health impacts of climate change*17*18

Condition	Observed conditions	Disease name	IPCC WG8 Future assessment
Heat stress	Association with mortality and morbidity****	Heat-related illnesses	Increase in heat-related illnesses****
Food- and waterborne infections	Increased incidence**** Increased risk of aquatic pathogens in certain regions Higher incidence of diarrheal diseases associated with extreme weather and natural disasters	Vibrio*** Cyanobacteria** Cholera Other gastrointestinal infections	Increase in many regions*** Increase in schistosomiasis (Africa)***
Arthropod systems	Increase in number of outbreaks** Expansion of geographical range for vectors or increased reproduction***	Chikungunya (Americas, Asia, Europe)** Tick-borne encephalitis (Europe)** Lyme disease (North America***, Europe**) Rift Valley fever (Africa) West Nile fever (Europe, Asia, North America)** Malaria (eastern and southern African subregions)*** Dengue fever (worldwide)***	Expansion into higher latitudes/altitudes, longer infection periods *** Increase in Lyme disease*** Increase in malaria in 3 regions*** Risk of 2.25 billion new dengue infections in 4 regions***
Zoonosis	Emergence in new areas***	Anthrax Tularemia****	Increase in emerging zoonotic diseases**
Air Pollution	Increased exposure to forest fire smoke**** and pollen***	Cardiovascular and respiratory diseases	Increased respiratory disease due to airborne allergens and ozone***
Food insecurity	Increased risk***	Malnutrition***	Increased food insecurity*** Increased undernutrition and nutrition-related mortality and risk*** Increased malnutrition due to poor nutritional quality, reduced access to well-balanced diets, and inequality*** Hunger risk in Sub-Saharan Africa, South Asia, and Central America (8-80 million people by 2050) Increase in cardiovascular mortality of 69% to 134% by 2080s (compared to 1980s)***
Food safety	Increased risk in agriculture and fisheries*** Greater food safety impact***	Increased illness due to ingestion of toxins and contaminants (toxigenic fungi ****, persistent organic pollutants (POPs)**, methylmercury**) Increase in bacterial infections (Salmonella, Campylobacter, Cryptosporidium)**, mycotoxins associated with stunting and cancer in children***, seafood contamination by marine toxins and pathogens***	Decreased food safety*** due to increased toxigenic fungi****, POPs**, methylmercury**, Campylobacter, E. coli, Salmonella**
Water sanitation and hygiene (WASH)	Increased risk of disease***	Waterborne and water-related diseases Malnutrition	Increased water-related risk***

DALYs: disability-adjusted life-years; POPs: persistent organic pollutants; WASH: water sanitation and hygiene

**** Very high confidence *** High confidence **Moderate confidence **Low confidence

*17 World Health Organization. (2022). Review of IPCC Evidence 2022: climate change, health and well-being. World Health Organization. Retrieved March 18, 2024, from https://www.who.int/%20publications/m/item/review-of-ipcc-evidence-2022--climate-%20change--health--and-well-being.

*18 World Health Organization. (2022). Review of IPCC Evidence 2022: climate change, health and well-being. World Health Organization. Retrieved March 18, 2024, from https://www.who.int/%20publications/m/item/review-of-ipcc-evidence-2022--climate-%20change--health--and-well-being.

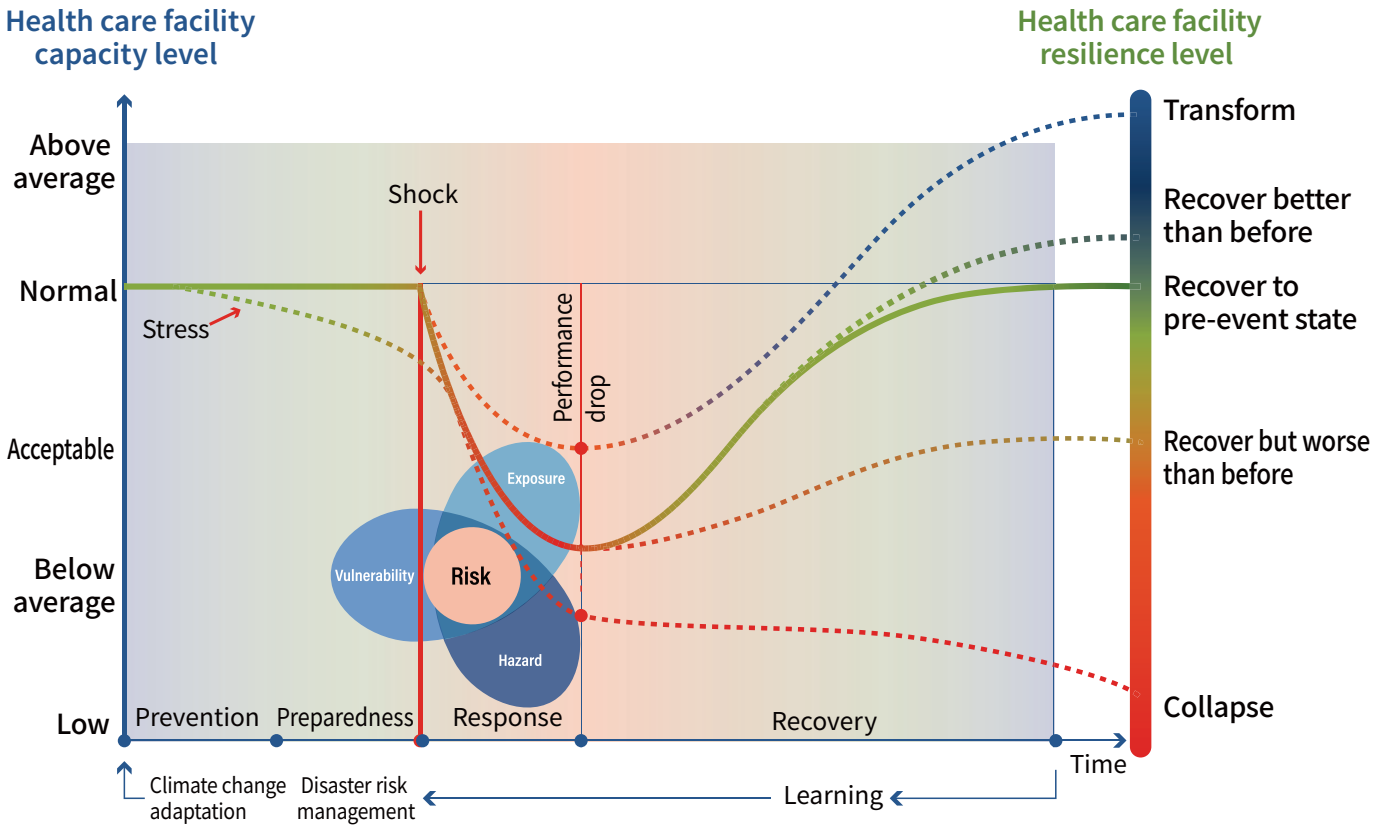
3) Impacts on health systems and infrastructure

In addition to impacting the health of individuals and groups, climate change will also affect health systems. These effects will not be limited to industry. Rather, climate change will hinder the ability of health systems to function through damage to infrastructure such as schools, parks, hospitals, and long-term care and welfare facilities, which are forms of social capital related to daily life. It will also upset functions performed by the health system through damage to or loss of medical devices, products, and equipment; effects on water, waste, energy, and transportation systems; disruptions to supply chains; and effects on the health workforce.

The Coronavirus Disease 2019 (COVID-19) pandemic provides a recent example of an event that demonstrated the vulnerabilities of health systems around the world. The COVID-19 pandemic resulted in an unexpected and unprecedented collapse of health systems, but the effects of climate change are likely to be much more severe. Moreover, major humanitarian issues are likely to occur when climate change-related disasters and health system vulnerabilities overlap.

Figure I-7 provides a conceptual framework for the climate resilience in health systems.*19 Health system resilience is based on a complex combination of the intensity of hazards, existing vulnerabilities within systems, and extent of exposures. The vertical axis of Figure I-7 represents health system response capacity and is important for determining the impacts of shocks and stresses. Low resilience may cause a health system to collapse or have diminished capacity to deliver services due to inadequate stock or human resources, leading to situations that are worse than before the adverse event. There has been no progress in addressing health system vulnerability with respect to resilience.

Figure I -7 Health system capacity and resilience



*19 World Health Organization. (2023). Operational framework for building climate resilient and low carbon health systems. In Operational framework for building climate resilient and low carbon health systems. https://www.who.int/publications/i/item/9789240081888.

II

International trends in climate change and health

II International trends in climate change and health

1. The United Nations Framework Convention on Climate Change (UNFCCC) and G7 meetings

The concept of planetary health became widely known after the Lancet-Rockefeller Foundation Commission on Planetary Health published a report in The Lancet titled "Safeguarding human health in the Anthropocene epoch" in 2015.*20 A consortium of universities, private organizations, and NGOs called the Planetary Health Alliance (PHA) was established that same year to promote the knowledge systems, expertise, and policy developments needed to address challenges described in that report.*21

In response to a growing body of data on the human health impacts of climate change, the UK and 46 other countries pledged to build climate resilient and low carbon sustainable health systems at the 2021 United Nations Climate Change Conference (COP26) held in Glasgow in October 2021.*22*23 This led to the formation of the Alliance for Transformative Action on Climate and Health (ATACH).*24

ATACH was established within the World Health Organization (WHO) to serve as a unified platform for its partners to realize their commitments through mutual support. As of March 2024, 82 countries are participating in ATACH. In addition to government agencies, the Alliance has active involvement from parties like NGOs, philanthropic organizations, and academic institutions.

Discussions at COP27 held in Sharm El Sheikh, Egypt in November 2022 were centered on health and equity. There, participants reported their progress on COP26 initiatives for building climate resilient and low carbon sustainable health systems to further advance such developments in Latin America.*25 There was also a series of events showcasing initiatives and solutions to maximize the health benefits of addressing climate at the Health Pavilion.

In addition to objectives for pandemic preparedness and addressing antimicrobial resistance (AMR) adopted at the G7 Health Ministers' Meeting, participants expressed the shared recognition for the need to build climate-resilient, sustainable, and net-zero health systems at the G7 Hiroshima Summit in May 2023.*26 With a view to strengthening engagement with the Global South, leaders from eight countries representing regions such as Asia (ASEAN), Africa (the African Union, AU), the Indo-Pacific, and the Pacific Islands and heads of related international organizations were also invited for a discussion on issues that are growing more severe on a global scale such as climate change, the environment, and energy.*27 They reaffirmed that they would reinforce cooperation to advance concrete initiatives to build a sustainable world through actions such as controlling environmental pollution, conserving biodiversity, conserving forests, and addressing marine pollution.

At COP28 in Dubai, United Arab Emirates (UAE) in November 2023, health ministers from various countries were invited to a ministerial meeting on what was designated as Health Day. Recognizing that the climate crisis is a health crisis, their discussion highlighted the five topics described below.

1. **Presenting evidence-based, clear impact pathways between climate change and human health**
2. **Promoting health arguments for climate action and health co-benefits of mitigation**
3. **Highlighting needs, barriers and best practices for strengthening climate resilience of health systems**
4. **Identifying and scaling adaptation measures to address the impacts of climate change on human health**
5. **Climate change is estimated to cause 250,000 excess deaths each year, and WHO will host a Health Pavilion**

*20 See footnote 7.

*21 Hart, J. (2022). Planetary Health Alliance: Environmental Change and Health—The Critical Need for Clinician Involvement. Integrative and Complementary Therapies, 28(4), 195-198. https://doi.org/10.1089/ict.2022.29026.pro.

*22 Friends of WHO Japan. Making Commitments to Low Carbon Emissions for Health System Development [in Japanese]. https://japan-who.or.jp/news-releases/2111-14/.

*23 Ageing and health. (2022). World Health Organization (WHO). Retrieved March 18, 2024, from https://www.who.int/news-room/fact-sheets/detail/ageing-and-health.

*24 Alliance for action on climate change and health (ATACH). (2021). World Health Organization (WHO). Retrieved March 18, 2024, from https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health.

*25 Highlights of some key health events at COP27. (2022). World Health Organization (WHO). Retrieved March 18, 2024, from https://www.who.int/news/item/03-11-2022-highlights-of-some-health-key-health-events-at-cop27.

*26 G7 Health Ministers' Communique. (2023). G7 Nagasaki Health Ministers' Communiqué. Retrieved March 18, 2024, from https://www.mhlw.go.jp/content/10500000/001096403.pdf.

*27 MHLW, 2023. "G7 Health Ministers' Meeting in Nagasaki Official Page, MHLW." https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/hokabunya/kokusai/g8/g7health2023_en.html. Accessed 24 March 2024.

The COP28 UAE Climate and Health Declaration was also endorsed by leaders of 143 countries, including Japan.*28 It heightens awareness of the interactions between health and climate change in the international community and encourages global cooperation.

2. Efforts to develop mitigation and adaptation plans around the world

In the midst of the global trends described above, many countries are advancing initiatives to assess climate change impacts and develop mitigation and adaptation plans, or National Adaptation Plans (NAPs). This section takes a brief look at some of these efforts.

In Europe, the Netherlands published "The effects of climate change in the Netherlands" in 2005 and later presented a climate adaptation plan. In the United Kingdom, an NAP was presented in 2013 with revisions in 2015 and 2021. The United States published "Global Climate Change Impacts in the United States" in 2009, which was followed by an executive order from the President in 2013 that set the direction of adaptation efforts. The United States published its fifth National Climate Assessment in 2023.*29 In Asia, South Korea released its assessment report and the "Adaptation Strategy to Climate Change" in 2010 and presented the 2nd Basic Plan for Climate Change Response in 2019.

In the health sector, measures for climate change include the UK's announcement of the Greener NHS program in 2023. This program aims to create the world's first net zero health service through a decarbonization plan for net-zero real CO_2 emissions by 2040.*30 In Australia, the Department of Health and Aged Care released the country's first National Health and Climate Strategy in December 2023.*31 In addition to building a climate resilient health system, it includes a chapter on decarbonizing the health sector as well as details on challenges that must be addressed.

*28 COP28. (2023). COP28 UAE Declaration on Climate and Health. Retrieved January 2, 2024, from https://www.cop28.com/en/cop28-uae-declaration-on-climate-and-health.

*29 Fifth National Climate Assessment. https://nca2023.globalchange.gov/

*30 NHS England. (2023). https://www.england.nhs.uk/greenernhs/a-net-zero-nhs/. Accessed 24 March 2024.

*31 Australian Government Department of Health and Aged Care. (2023). National Health and Climate Strategy https://www.health.gov.au/sites/default/files/2023-12/national-health-and-climate-strategy.pdf.

3. The increase in climate litigation and spread of the concept of climate justice

In recent years, many cases have been filed in response to the growing trend to view the right to health as a human right, leading to greater legal risk of not taking action to increase resilience to climate change. These types of cases are referred to as "climate litigation."

Climate litigation includes lawsuits for and against climate measures as well as lawsuits intended to delay climate measures. The United Nation Environmental Programme (UNEP) reports that as of December 2022, 2,180 climate-related cases had been filed in 65 bodies including international and local courts, tribunals, quasi-judicial bodies, or other adjudicative bodies such as UN special procedures or arbitration tribunals.*32 Approximately 1,500 of these cases were brought in the United States. In 2023, in the United States, a group of young people filed a case against the Montana state government that resulted in a historic ruling that a state law restricting research on GHG emissions before supporting fossil fuel development was in violation of the Montana state constitution.*33 That same year, the State of California filed a lawsuit against major oil companies and the American Petroleum Institute which claimed these companies deceived the public about climate change and the dangers of fossil fuels for decades.*34 A group of young people in Portugal sued 32 governments in the European Court of Human Rights over claims that the governments violated their human rights by failing to adequately address climate change.*35

Compared to Europe and the US, climate litigation in Japan is extremely rare, with only four reported disputes, which were related to the construction of new coal-fired power plants. In 2017, a civil lawsuit sought an injunction to the operation of a coal-fired plant in Sendai, Japan on the grounds that emissions of air pollutants such as SOx and NOx and climate-altering CO_2 emissions would harm human life and wetland ecosystems. In 2018, residents living near the construction site of a coal-fired power plant brought a civil lawsuit against Kobe Steel Ltd. and Kansai Electric Power Co., Inc. that sought an injunction against the construction and operation of new units. They also filed an administrative case against the Government that demanded the cancellation of a Notice of Finalization based on an environmental impact assessment report.*36 In that lawsuit, the plaintiffs claimed that the damage caused by global warming would violate their right to a peaceful life (or, the right to a stable climate), but the court ruling denied any such infringement.

The lawsuits are establishing significant legal precedents regarding climate change, which is increasingly viewed as an infringement upon the fundamental right to a clean and healthy environment due to corporate and government inaction. These cases also demonstrate a growing recognition toward the perspective of climate justice and the fact that climate change has unequal and harmful impacts on certain groups, particularly those affected by social and environmental factors.

*32 Global Climate Litigation Report: 2023 Status Review. UNEP, 27 July 2023, https://www.unep.org/resources/report/global-climate-litigation-report-2023-status-review. Accessed 24 March 2024.

*33 Yale Experts Explain Climate Lawsuits | Yale Sustainability. (2023). Yale Sustainability. Retrieved March 18, 2024, from https://sustainability.yale.edu/explainers/yale-experts-explain-climate-lawsuits.

*34 People of the State of California v. Big Oil | California Governor. (2023). California Governor. Retrieved March 18, 2024, from https://www.gov.ca.gov/2023/09/16/people-of-the-state-of-california-v-big-oil/.

*35 HATTON, B. (2023). In unprecedented case, young climate activists taking 32 governments to human rights court. Los Angeles Times. Retrieved March 18, 2024, from https://www.latimes.com/world-nation/story/2023-09-25/six-young-activists-devote-years-to-climate-fight-with-32-governments-now-comes-their-day-in-court.

*36 ENVIRONMENTAL LAW BULLETIN. (2023). MORI HAMADA & MATSUMOTO. Retrieved March 18, 2024, from https://www.mhmjapan.com/content/files/00069337/20231122-103926.pdf.

III

Adaptation, mitigation, and co-benefits

III Adaptation, mitigation, and co-benefits

In broad terms, measures for climate change can be classified into two categories: adaptation measures, which aim to adjust natural ecosystems or social and economic systems to climate change to lessen adverse impacts; and mitigation measures, which aim to reduce the GHG emissions that cause climate change.

For the health sector in particular, it will be essential to ensure equity by providing high-quality services, to minimize health disadvantages caused by climate change, and to reduce health disparities. The IPCC report describes health sector response capacity as vulnerable and states the most vulnerable people (climate vulnerable groups) are already experiencing severe negative impacts of climate change. These circumstances require adaptation measures to be implemented rapidly and in a prioritized manner. Given this context, the following first describes adaptation measures, which are more urgent. Mitigation measures implemented with a view to the medium to long term will be described afterwards and are based on adaptation measures.

1. Adaptation measures

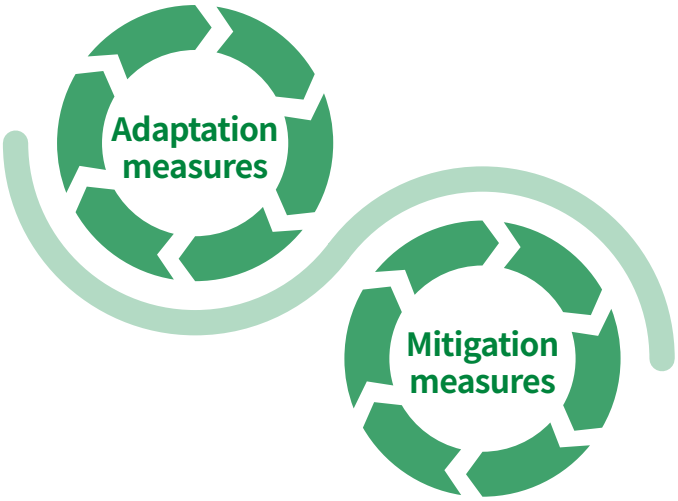
Adaptation and mitigation measures go hand in hand in addressing climate change. Adaptation refers to processes of adjusting to actual or expected climate change and its effects. It also includes activities that help societies avoid adverse impacts while taking advantage of beneficial opportunities that emerge.*37

The objective of health system adaptation is to build stronger, more climate-resilient health systems.*38 Resilience means the capacity to maintain a system's critical functions, structures, and essence while responding and reorganizing in a manner that preserves its ability to adapt, learn, and transform.

In concrete terms for health system resilience, it refers to the ability to anticipate, prevent, avoid, and transform in the face of crises and stresses and the capacity and coping ability to continue providing necessary health services at all times. Business Continuity Planning (BCP) is an adaptation effort for responding to natural disasters and other emergencies at the facility or office level.*39 The goal of climate change-related crisis response is to improve population health in an unstable climate by anticipating, coping with, and adapting to crises through intersectoral cooperation.

2. Mitigation measures

Mitigation is the other critical aspect in climate action and refers to measures to reduce or prevent GHG emissions to decelerate climate change and related impacts. Specific examples of mitigation measures include reducing GHG emissions through policies and regulations, removing GHGs in the atmosphere through carbon capture and storage, and changing behaviors at the individual level.



*37 National Institute for Environmental Studies. (2016). Climate Change Adaptation Information Platform (A-PLAT). Retrieved January 18, 2024, from https://adaptation-platform.nies.go.jp/.

*38 World Health Organization. (2022). Measuring the climate resilience of health systems. World Health Organization. https://apps.who.int/iris/bitstream/handle/10665/354542/9789240048102-eng.pdf.

*39 MHLW. (2021). "Business Continuity Planning (BCP) for Disaster Response in Health Facilities" Retrieved March 18, 2024, from https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryou/kenkou/kekkaku-kansenshou/infulenza/kenkyu_00001.html.

3. Health co-benefits of mitigation measures

Mitigation and adaptation measures are not entirely unrelated. In fact, a number of synergies between them have been identified. In this section, we will focus on health co-benefits. In broad terms, "co-benefits" refers to the positive effects that policies and measures with specific objectives have on other objectives.*[40]

"Health co-benefits" refers to how mitigation measures aimed at reducing GHG emissions can benefit health. Health co-benefits are being investigated in several sectors including energy, land transport, and food and agriculture.*[41]

Energy

Actions like transitioning to clean energies or implementing sustainable transportation that decarbonize energy production are likely to reduce pollutants in the atmosphere, thereby lowering the risk of health concerns such as respiratory and cardiac diseases. In a similar manner, initiatives to enhance energy efficiency and reduce energy demand in the housing sector will lead to less exposure to air pollutants. Expectations are high for such initiatives to increase Quality-Adjusted Life Years (QALYs).

Transportation

In land transport, emphasis is being placed on increasing the use of clean energy vehicles, adopting active modes of travel, and reducing need to travel or travel distance. Cleaner travel and shorter travel distances will decrease GHG emissions while reducing air pollution and noise. Active modes of travel also provide significant health benefits by increasing physical activity.

Urban planning

In addition to improving air quality, sustainable urban planning (e.g., green infrastructure) has positive impacts on health by reducing urban heat islands and promoting physical activity through mobility.

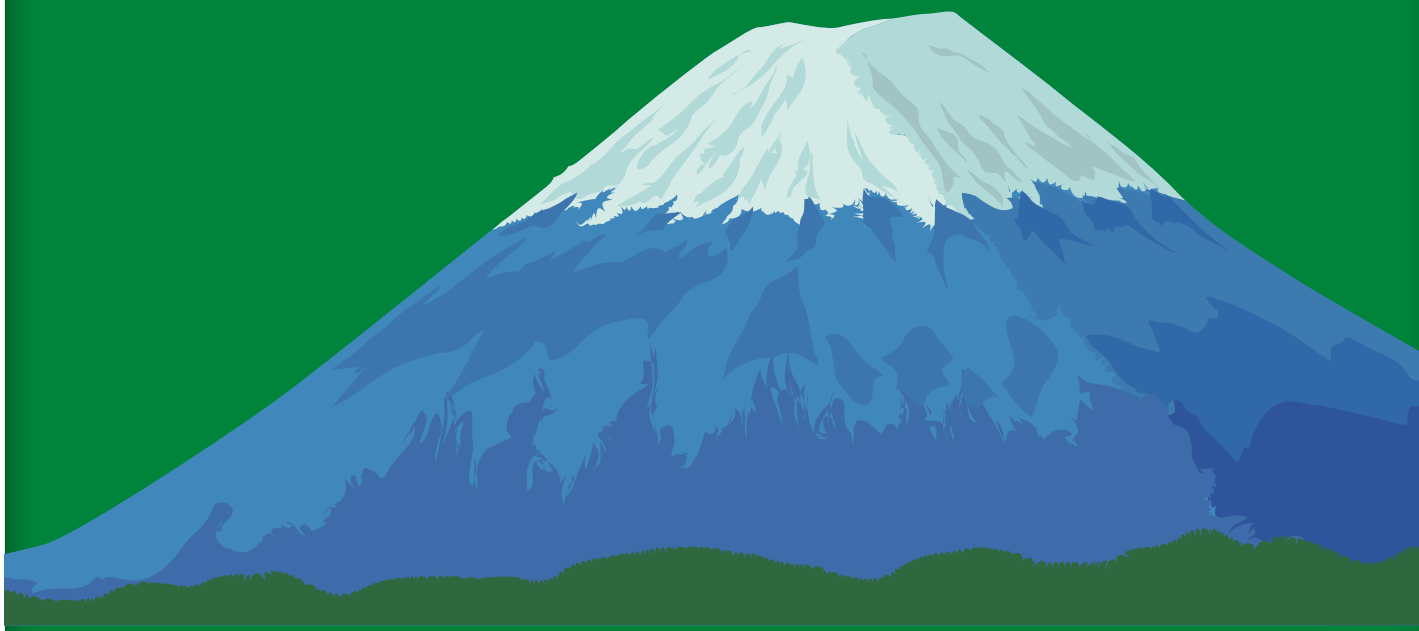
Sustainable urban planning is also likely to have significant benefits for mental health and wellbeing as well as Social Determinants of Health (SDH) like social connectedness, while reducing the frequency and severity of acute episodes of CVD, asthma, and chronic obstructive pulmonary disease (COPD).

*40 Mayrhofer, J. P., & Gupta, J. (2016). The science and politics of co-benefits in climate policy. Environmental Science & Policy, 57, 22-30. https://doi.org/10.1016/j.envsci.2015.11.005,

*41 Milner, J., Hamilton, I., Woodcock, J., Williams, M., Davies, M., Wilkinson, P., & Haines, A. (2020). Health benefits of policies to reduce carbon emissions. BMJ, 368. https://doi.org/10.1136/bmj.l6758.

IV

Objectives and principles of health sector climate action



IV Objectives and principles of health sector climate action

The adaptation and mitigation measures described below are presented with four main objectives in mind.

1 Build a climate resilient health system and enhance its capacity to protect health and wellbeing for people living in Japan from the adverse effects of climate change

- Provide high-quality, equitable health services that are tailored to communities and cultures while supporting the ability of health services and communities to function as normal despite a changing climate

2 Create a health system with net-zero GHG emissions through the supply chain and that contributes to achieving carbon neutrality by 2050

- Minimize the health system's environmental impact and achieve the Government's emission reduction target of net zero by 2050

3 Advance global cooperation in building climate resilient and sustainable health systems and societies

- Make full use of resources such as the National Institute for Environmental Studies (NIES) Climate Change Adaptation Information Platform (A-PLAT) and promote efforts to expand scientific knowledge on climate risks, to utilize support tools, and to strengthen adaptation capacity together with other countries and related organizations
- Seek opportunities to share scientific knowledge from Japan, contribute to the development of international standards, and cooperate with neighboring countries to promote better health by addressing climate change

4 Recognize that health and climate change are interrelated and support the creation of healthy, climate resilient, and sustainable communities through whole-of-government action

- Using an approach that prioritizes health in all policies, promote the health co-benefits of reducing GHG emission throughout society

Our recommendations regarding adaptation and mitigation measures are based on the following five principles.

1 Placing the concept of planetary health at the foundation

- While thinking of the health of the global ecosystem and the health of people and human society, their interdependent nature must be clarified and research and implementation measures that humanity can use to ensure sustainability through the sound management of nature must be pursued.

2 Emphasizing public health through health promotion and disease prevention for the population

- Public health promotion and disease prevention are fundamental principles of mitigation and adaptation throughout these strategies. These items are to be given strong support at all stages, from primary to tertiary prevention, by taking environmental and social determinants of health into account.
- Climate-driven changes in the environment and human-social systems will be viewed in terms of environmental and social determinants of health.
- Prevention of new diseases and exacerbation of chronic diseases through appropriate prevention measures will reduce GHG emissions and produce health co-benefits by lowering healthcare demand.

3 Adhering to evidence-based policymaking (EBPM)

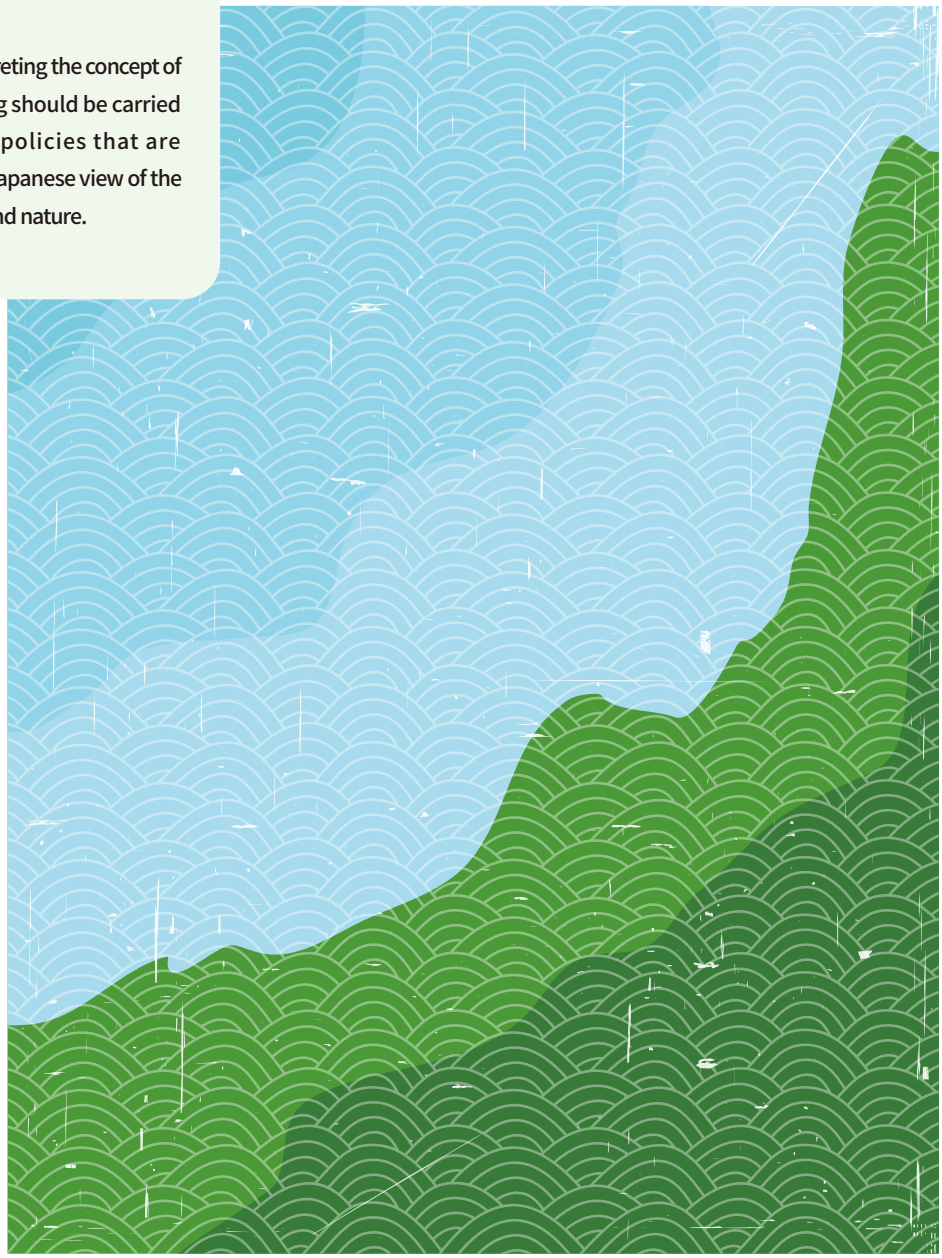
- Climate change policies should be based on the latest scientific knowledge and make maximum use of available data and evidence. In areas where clear evidence has yet to be established, policymaking should be conducted with caution.
- Research on the health impacts of climate change as well as the impacts of health system activities on public health and society should both be advanced. Findings from both should be reflected in policymaking.

4 Guaranteeing opportunities for people to enjoy good health and ensure health equity

- Equal opportunities to enjoy good health should be guaranteed for everyone, and every person should have opportunities to enjoy the best physical and mental health they can possibly attain.
- Consideration must be given to senior citizens, children, people with chronic non-communicable diseases, people with mental disorders, and other climate vulnerable groups so they can enjoy the same health benefits as healthy people.

5 Harmonizing with the traditional view of nature in Japanese culture

- The traditional Japanese view of nature is based on the premise that humans must revere and coexist with nature and is characterized by an ambiguous distinction between humans and nature, an emphasis on natural and seasonal transitions and cycles, and a non-linear, cyclical view of time and events.*42*43
- While understanding and interpreting the concept of planetary health, policymaking should be carried out with care to formulate policies that are consistent with the distinctive Japanese view of the relationship between humans and nature.



*42 Hayashi F, Hayashi C, Sugawara S, Miyazaki M, Yamaoka K, Kitada J. The Japanese view of nature (2). Journal of the Japanese Wildlife Research Society. 1995;21, 44-52. https://www.jstage.jst.go.jp/article/jjwrs/21/0/21_KJ00009905129/_pdf/-char/ja.

*43 Terada T. (2016). The Japanese View of Nature. Goma Books Co., Ltd.

V

Adaptation measures:

Protecting human health and communities from climate change

1. Current status and projections for climate change in Japan

1) Current status and projections for climate change in Japan

The following was created while referring to Climate Change in Japan (2020) and the Climate Change Monitoring Report 2022 from the Japan Meteorological Agency (JMA).*44*45 Climate Change in Japan (2020) is a report prepared by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the JMA to fulfill the Government's responsibilities to provide a source of basic information on climate measures, as described in the Climate Change Adaptation Act.

According to these reports,

- **Rainfall patterns will change. Increased temperatures will allow the atmosphere to store more water vapor, which will amplify the frequency and intensity of intense rainfall events with a short duration. At the same time, it will be difficult to predict total rainfall in Japan.**
- **The energy source for tropical cyclones is water vapor from the sea surface. As the sea surface temperature rises, tropical cyclones that form near Japan may become stronger.**
- **The increase in sea temperatures will not occur only at the surface, but also deep underwater. Sea levels will rise as ice sheets and glaciers melt. In addition, tropical cyclones approaching or making landfall may cause larger storm surges, increasing the risk of flooding.**
- **Changes in ocean pH have also been observed. Approximately 30% of the CO_2 emitted into the atmosphere is absorbed by oceans, where it forms carbonic acid. Some are concerned that this will cause ocean pH to shift from slightly alkaline to acidic. This negatively affects marine organisms that form shells and skeletons from calcium carbonate.**

2) Climate change impacts on health

The Ministry of the Environment (MOE) report titled Assessment Report on Climate Change Impacts in Japan, December 2020 gives an overview of how climate change affects the health sector.

Details on current circumstances are as follows.

- **Heat-related impacts**
  - The number of heat-related excess deaths is increasing, especially among senior citizens.
  - While the number of cases of heat stroke fluctuates from year to year, the number of people transported to emergency rooms, people treated at health institutions, and deaths are on the rise.
  - Young people face increased risk of heat stroke during outdoor activities due to the increase in the number of days on which the temperature rises above 30°C or 35°C.
- **Infectious diseases**
  - There are new reports of changes in risk and prevalence patterns of infectious diseases caused by changes in outdoor temperature for diseases such as infectious gastroenteritis, rotavirus, influenza, hand-foot-and-mouth disease, and waterborne and foodborne infectious diseases such as diarrhea.

The report also provides the following future projections.

- **Rising temperatures will increase heat stress and the risk of heat-related illnesses, especially among elderly people.**
- **Rising temperatures are expected to increase water- and food-borne infectious diseases in Japan toward the end of the 21st century, mainly due to higher prevalence of bacterial diarrhea.**
- **Hotter temperatures may allow the Asian tiger mosquito (hitosujishimaka, or Aedes (Stegomyia) albopictus) to expand to southern Hokkaido, where it has not yet reached or become established. The distribution of alien mosquitoes that transmit the Japanese encephalitis virus may expand north of Kagoshima Prefecture.**
- **Tick species that prefer warmer regions have been reported in the Tohoku region. Ticks introduced from overseas may also become established in Japan.**
- **In the short term to the 2030s, there will be more excess deaths due to increases in pollutants such as photochemical oxidants and ozone caused by global warming.**

*44 Ministry of the Environment. (2020). Assessment Report on Climate Change Impacts in Japan, December 2020. Retrieved January 18, 2024, from https://www.env.go.jp/content/900516664.pdf.

*45 JMA. (2023). Climate Change Monitoring Report 2022. Retrieved December 20, 2023, from https://www.data.jma.go.jp/cpdinfo/monitor/2022/pdf/ccmr2022_all.pdf.

As noted in the previous section, it has become clear that people in Japan will face significant health impacts due to factors such as rising temperatures, changes in precipitation, rising sea levels, and ocean acidification. In addition to increased risk for heat-related illnesses and mortality due to greater heat stress, hotter temperatures also cause various other diseases such as respiratory diseases and CVDs through the accelerated formation of air pollution.

Table V-2 shows the results of the risk assessment for the health sector-related items discussed in the Climate Change Adaptation Plan. The assessment uses scientific evidence to compare and evaluate results for major risks.

As shown below (See Table V-1), impacts are assessed in terms of significance, urgency, and confidence.

Table V -1 Assessment Report on Climate Change Impacts in Japan assessment results

Significance	Assessed from three perspectives: society, economy, and environment
Urgency	Assessed from two perspectives: timing of impacts and timing of necessary adaptation measures and key decision-making
Confidence	With partial adaptation of approaches to confidence used in the IPCC AR5, items were assessed in terms of two criteria: Type of research/report (e.g., quantitative projection based on model simulation; projection using an index for degree of increase in temperature; qualitative analysis or estimates); and degree of agreement. When research/reports were limited in number (e.g., only one or two), judgment was used to determine if their content was reasonable.

Table V -2 Risk assessment for the health sector

Results of climate change impact assessment (comparison with previous assessment)

Sector	Category	No.	Sub-categories	Previous (2015)			Current assessment (2020)		
				Significance	Urgency	Confidence	Significance	Urgency	Confidence
Human Health (35→178)	Winter warming	511	Mortality in winter season	◆	■	■	◆	▲	▲
	Heat stress	521	Risk of mortality	●	●	●	●	●	●
		522	Heat illness	●	●	●	●	●	●
	Infectious diseases	531	Water-and food-borne diseases	—	—	■	◆	▲	▲
		532	Arthropod-borne infectious diseases	●	▲	▲	●	●	▲
		533	Other infectious diseases	—	—	—	◆	■	■
	Others	541	Complex impacts of warming and air pollution	—	▲	▲	◆	▲	▲
		542	Impacts on vulnerable populations (elderly, children, persons with underlying health conditions, etc.)	—	●	■	●	●	▲
		543	Other health impacts				◆	▲	▲

※ Numbers in parentheses below the sector name:
the change in number of items of literature
from previous to the current assessment
(numbers do not include 65 items cited in multiple sectors)
※ **Red font** : items newly added since the previous impact assessment
※ **Hatching** : categories in which assessments has been revised upward

Significance	Urgency	Confidence
● : Recognized as having particularly significant impacts ◆ : Recognized as having impacts — : N/A (currently cannot be assessed)	● : High ▲ : Medium ■ : Low — : N/A (currently cannot be assessed)	● : High ▲ : Medium ■ : Low — : N/A (currently cannot be assessed)

2. Current measures related to climate change

In this section, we will review Japan's current policies on climate adaptation. Specifically, we will look at the Climate Change Adaptation Act, the Climate Change Adaptation Plan, and the Action Plan for Heat Illness Prevention.

1) The Climate Change Adaptation Act

Japan has enacted a law for promoting climate adaptation efforts called the Climate Change Adaptation Act.*46 It was enacted in June 2018 and came into effect later that year, in December. It clarifies the legal status of climate adaptation and aims to provide strong backing to adaptation efforts through multi-stakeholder cooperation including parties like the national Government, local governments, the private sector, and citizens.

2) The Climate Change Adaptation Plan

Centered on the MOE, Japan's Climate Change Adaptation Plan was formulated in November 2018.*47 This led to the compilation and release of the Assessment Report on Climate Change Impacts in Japan in December 2020. That Report was compiled in accordance with the Climate Change Adaptation Act and was based on scientific findings on climate change and on observations, monitoring results, predictions, and assessments of climate impacts in various sectors. The Climate Change Adaptation Plan was revised in accordance with Article 8 of the Climate Change Adaptation Act in October 2021.

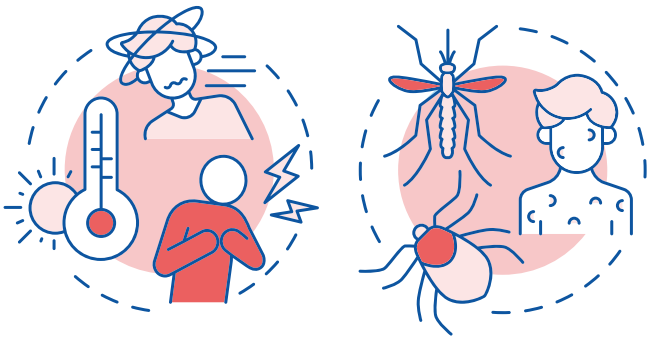
The Climate Change Adaptation Plan is in effect for five years and it aims to build a safe, secure, and sustainable society by preventing or mitigating damage from climate impacts, stabilizing daily life for citizens, encouraging healthy social and economic development, preserving the natural environment, and enhancing the resilience of Japan's national land. When the Plan was revised, adaptation measures were expanded to 71 categories in 7 sectors based on the Assessment Report on Climate Change Impacts in Japan (agriculture, forestry and fisheries; natural disasters; water resources; ecosystems; industrial and economic activities; life of the citizenry and urban life; and human health). Points that were included are described below.

Seven Basic Strategies:

1. **Mainstreaming adaptation in all policies**
2. **Promoting science-based adaptation**
3. **Developing information platform as a center of excellence**
4. **Localizing adaptation actions**
5. **Understanding of citizens and business**
6. **Assistance to developing countries**
7. **Cooperation among ministries**

Specific adaptations are as follows

1. **Heat adaptation measures include transmitting early warning information using heat stroke alert systems; transmitting prevention information using a combination of dissemination, awareness-raising, and other means; providing appropriate information to elderly households and outdoor workers; and action and collaboration for parties such as the national Government, local governments, and the private sector.**
2. **Adaptive measures for infectious diseases described in the plan include preventing the outbreak and spread of arthropod-borne diseases; ascertaining trends in disease outbreaks; and accumulating scientific knowledge on how infection risks change with climate change.**
3. **Due to the current lack of sufficient information, efforts will be devoted to accumulating scientific knowledge on warmer winters.**
4. **Other measures include protecting highly vulnerable populations, such as elderly people, and conducting research on links among environmental information and existing data, such as mortality data.**



*46 MOE. (2018). The Climate Change Adaptation Act. Retrieved March 18, 2024, from https://www.env.go.jp/earth/earth/tekiou/page_00608.html.

*47 MOE. (2023). The Climate Change Adaptation Plan – Follow-up. Retrieved March 18, 2024, from https://www.env.go.jp/earth/earth/tekiou/page_00004.html.

3) Action Plan for Heat Illness Prevention

The basis of the Action Plan for Heat Illness Prevention is the Climate Change Adaptation Act, the Act to Partially Amend the Climate Change Adaptation Act, and the Act on the Environmental Restoration and Conservation Agency (ERCA), which were enacted in April 2023.*48 The Action Plan was approved by Cabinet Decision in May 2023 and was created to deepen measures for heat stroke through actions such as the establishment of systems that strengthen heat stroke prevention. The Action Plan includes a number of concrete measures. Specifically, it upgrades plans related to heat stroke to statutory Cabinet-approved action plans, provides legal recognition for heat stroke alerts as warning information for heat-related illnesses, and systematizes municipal mayors' designations of heat evacuation facilities and organizations for the promotion of heat-related illness prevention.

One interim goal of the Action Plan for Heat Illness Prevention is to reduce the number of heat stroke deaths from the current level of approximately 1,300 per year by 50% by 2030. To achieve this goal, it also outlines roles for the national Government, local governments, businesses, citizens, and the ERCA. The national Government will engage in intensive and systematic measures for heat stroke, reinforce collaboration among related ministries and agencies and with local governments or similar parties, and foster understanding of heat stroke and its prevention. Local governments are to establish internal agencies for heat stroke and advance independent measures for heat stroke. It directs businesses to engage in business initiatives that tie in to heat stroke prevention for consumers and other parties, as well as to protect employees from heat stroke. Citizens are to take proactive measures for heat stroke prevention, call out to others around them, and engage in mutual assistance.

The Action Plan for Heat Illness Prevention includes these six specific measures.

1. **Raise awareness and provide information to protect life and health**
2. **Implement measures for heat-related illnesses targeting elderly people, children, and other vulnerable groups**
3. **Implement measures for heat-related illnesses in facilities with managers (schools, workplaces, sports facilities, etc.)**
4. **Implement measures for heat-related illnesses at local governments and other relevant local entities**
5. **Cooperate with the private sector**
6. **Conduct surveys and research on heat-related illness prevention**

The following two items are included for responding to extremely high temperatures:

7. **Respond to extremely high temperatures**
8. **Implementation and review action plans**

3. Issues with existing policies and the need to develop a health sector adaptation plan

Japan's climate measures face the following challenges in the health sector.

1. **The current Climate Change Adaptation Plan's risk assessment and measures in the health sector are limited to measures for individual disease areas. An assessment of the health system's climate vulnerability has yet to be conducted. Consequently, vulnerability assessments at appropriate levels including the national and local government levels have not yet been sufficiently conducted. Options based on those assessments also require more examination.**

   In addition to the direct and indirect pathways through which climate change may adversely affect health discussed above, its impact on health systems and social infrastructure also requires attention. Damage to buildings, equipment, energy and transportation systems caused by disasters disrupt supply chains and severely hinder response capacity for healthcare providers. Ensuring adequate climate resilience will be difficult without conducting vulnerability assessments of health system components such as the national Government, local governments, healthcare institutions, and supply chains; as well as for social infrastructure like energy, transportation, and roads.

2. **When attempting to mount appropriate responses to climate risks through surveillance for conditions like heat-related illness or infectious diseases, the systems for health hazard indicators, target conditions, real-time monitoring, and early warning are inadequate. Moreover, surveillance information is managed separately by the MOE, the Ministry of Internal Affairs and Communications (MIC), the MHLW, and other relevant agencies and is not**

*48 MOE. Action Plan for Heat Illness Prevention, May 2023. https://www.env.go.jp/content/000136710.pdf

linked or integrated with climate information. These circumstances hinder efforts to accrue scientific knowledge on climate change and health (See Table V-3).

Properly identifying climate risks and implementing effective preventive measures based on projections will require establishing a system that links and integrates information on climate and health hazards to synthesize scientific knowledge that will be useful for policymaking. One example is monitoring for heat stroke, which is a condition that is particularly vulnerable to climate change. Japan's definitions and scope of health hazards that necessitate reporting as well as methods used to measure those hazards are different from other countries. As a result, Japan's current methods of heat stroke surveillance do not fully capture the health hazards of heat stress. Moreover, surveillance systems for conditions such as heat stroke and infectious disease are not linked to climate data, and Japan lacks a system capable of analyzing the relationship between heat stroke incidence and climate change.

3. **The disasters that are most commonly considered in the context of disaster preparedness are those of a large scale, such as earthquakes, and there is a lack of focus on preparedness for disasters associated with climate change.**

The Basic Act on Disaster Management is comprehensive regarding natural disasters, covering events like wind storms, torrential rains, heavy snowfalls, floods, storm surges, and tidal waves. However, resources like the Disaster Medical Assistance Team (DMAT) Activity Guidelines contain only scattered references to natural disasters with the majority of attention being devoted to events like earthquakes and accidents. Additionally, DMAT skill maintenance training includes few opportunities to discuss response to climate disasters. Despite the likelihood of increased climate disasters in the future, disaster preparedness for events like heavy rains, floods, typhoons, and heat waves must be reinforced, but it is difficult to say preparations are adequate.

In a changing climate system, the health sector plays a key role in protecting and promoting health and wellbeing for the people of Japan. Climate change is expected to grow more severe in the future and, as we have seen in the past, failure to mount adequate responses causes actions to address health hazards to fall behind, ultimately creating an enormous burden for health systems. To fully grasp the complex and diverse impacts of climate change on human health and health systems and respond appropriately to likely future changes in the environment, it will be important to develop and implement adaptation measures that are focused on the health sector.

It will also be vital to introduce whole-of-government strategies that are in line with global trends and make a public commitment to building climate resilient and sustainable health systems. Around 80 countries have made commitments to the Alliance for Transformative Action on Climate and Health (ATACH) and the movement for building climate resilient health systems with health at the center of climate action is accelerating. A number of countries have already developed national strategies in the health sector, so in keeping pace with global trends, the Government of Japan should also formulate a national strategy for climate change in the health sector and provide its measures with strong support.*[49]

*49 Shimabukuro, A., Minamitani, K., & Sugawara, J. (2023). Rethinking Japan's Health System Sustainability Under the Planetary Health Framework. Health Systems & Reform, 9(1), 2268360. https://doi.org/10.1080/23288604.2023.2268360.

Table V -3 Comparison of Japan and Other Countries in Heat Stroke Prevention*50

		Japan	Overseas
Assessing damage	Perception of heat-related health effects	Heat stroke The moderate to most severe form of heat-related illness	Heat-related illness Includes deaths due to both direct and indirect effects of heat
	Heat damage indicators	Number of emergency transports, hospitalizations (fixed cooperating health institutions), and deaths diagnosed as heat stroke	Number of people hospitalized, number of excess deaths due to heat
Monitoring	Leading institutions	Fire Departments, Fire and Disaster Management Agency, MIC	Heath ministries
	Objectives	Grasping circumstances	Grasping circumstances and evaluating effectiveness of heat-health action planning (HHAP)
	Indicators	Number of emergency transports and deaths diagnosed as heat stroke	Number of people with heat-related illnesses and emergency room visits
	Systems	Fire Defense Agency, fire defense organizations	(Europe) Real-time surveillance (24-48 hours)
	Announcement intervals	1 week	1 to several days
Heat adaptation planning	Leading institutions	MOE, related ministries and agencies	Heath ministries
	Main content	Raise general awareness for self-help measures and proactively calling out to others	Intervention-specific measures and category-specific measures for vulnerable people
Early warning systems	Authority issuing warnings	MOE (JMA)	Developed and operated by weather agencies
	Objectives	Raise awareness and encourage preventive action when an area is predicted to have an extremely high risk of heat stroke	Communicate heat risk, initiate preventive actions and emergency procedures as key elements of HHAP
	Warning lead time	17:00 on day before warning is announced, and morning of announcement	1-5 days before warning is announced
	Organization leading heat measures	Local governments	Health ministries, national institutes of public health
	Number of alert levels	1	Baseline and two to five levels
	Alert triggers	Areas in each prefecture with Wet Bulb Globe Temperature (WBGT) 33 degrees or higher Thresholds uniform throughout Japan	Various thresholds including maximum daily temperature and weather indicators
	Alert indicators	WBGT	Maximum daily temperature, heat index, perceived temperature, etc.
	Alert targets	Local governments, citizens	Agencies with jurisdiction over preventive actions for heat Citizens Key stakeholders (hospitals, facilities for elderly people)
	Alert unit (geographical)	Prefectures	Considerations made at district and city level; elevation also taken into account

*50 From the G7 Health Communiqué to Action: Health and Climate - Heat Preparedness through Early Warning Systems. (2022). Global Heat Health Information Network. Retrieved March 18, 2024, from https://ghhin.org/wp-content/uploads/G7-report-heat-EWS.pdf.

4. Building a climate resilient health system

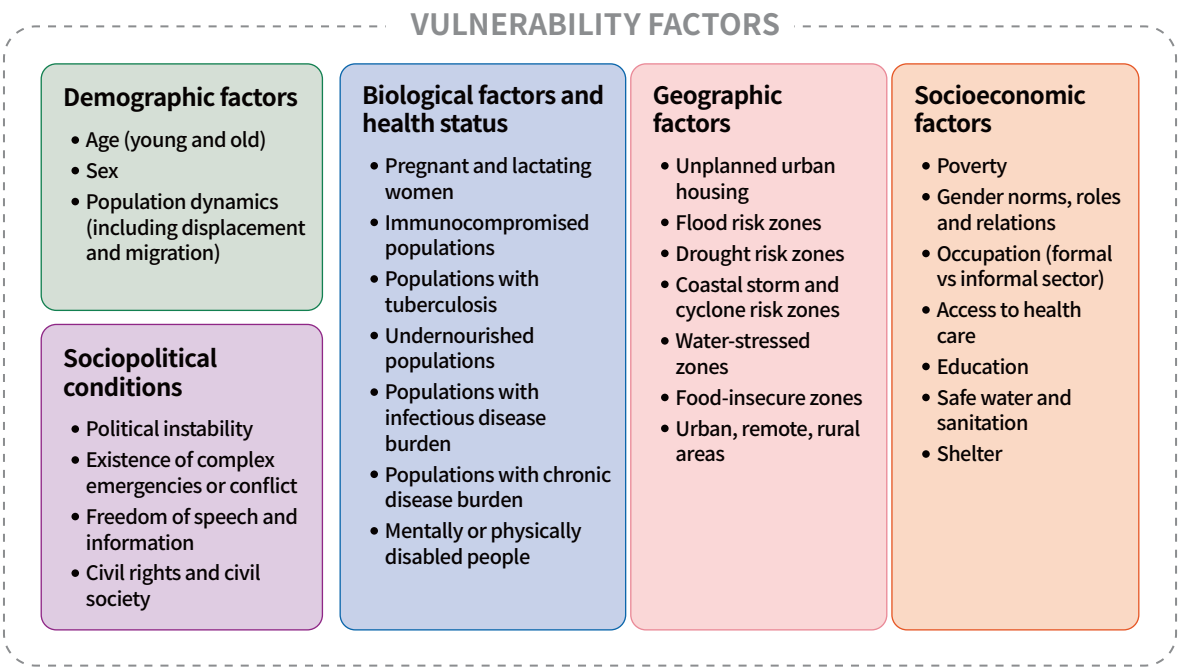
To build a climate resilient health system, we offer the following three recommendations.

1. **Conduct climate vulnerability and adaptation assessments at appropriate levels including the national Government, local governments, and health institutions, and incorporate results when formulating adaptation measures at each level or when updating BCPs and other plans.**
2. **Review disease surveillance systems for heat stroke and other diseases from the perspective of climate change and reinforce them to properly capture health hazards from heat-related illnesses. In addition, link and integrate heat stroke and infectious disease surveillance with climate information and establish an integrated surveillance system that incorporates climate information for appropriate climate risk monitoring and early response.**
3. **Strategically and effectively enhance climate disaster prevention and mitigation by conducting training programs for professionals in disaster and infectious disease response who are dispatched when disasters occur (such as Disaster Medical Assistance Teams (DMATs), Japan Medical Association Teams (JMATs), Disaster Psychiatric Assistance Teams (DPATs), and disaster medical nurses) and establishing a system to improve climate disaster preparedness and response.**

1) Assessing climate vulnerability

Vulnerability & Adaptation Assessments (V&As) are comprehensive assessments for identifying climate vulnerabilities and formulating adaptation plans at appropriate levels, such as national, regional, and sectoral levels. Specifically, V&As identify which groups and regions are most vulnerable to various impacts of climate hazards, detect vulnerabilities in health systems, identify adaptation options, and determine necessary interventions. As a reference, factors that contribute to vulnerability in the context of climate change and health are shown in Figure V-1.

Figure V-1 Factors related to vulnerability in climate change and health



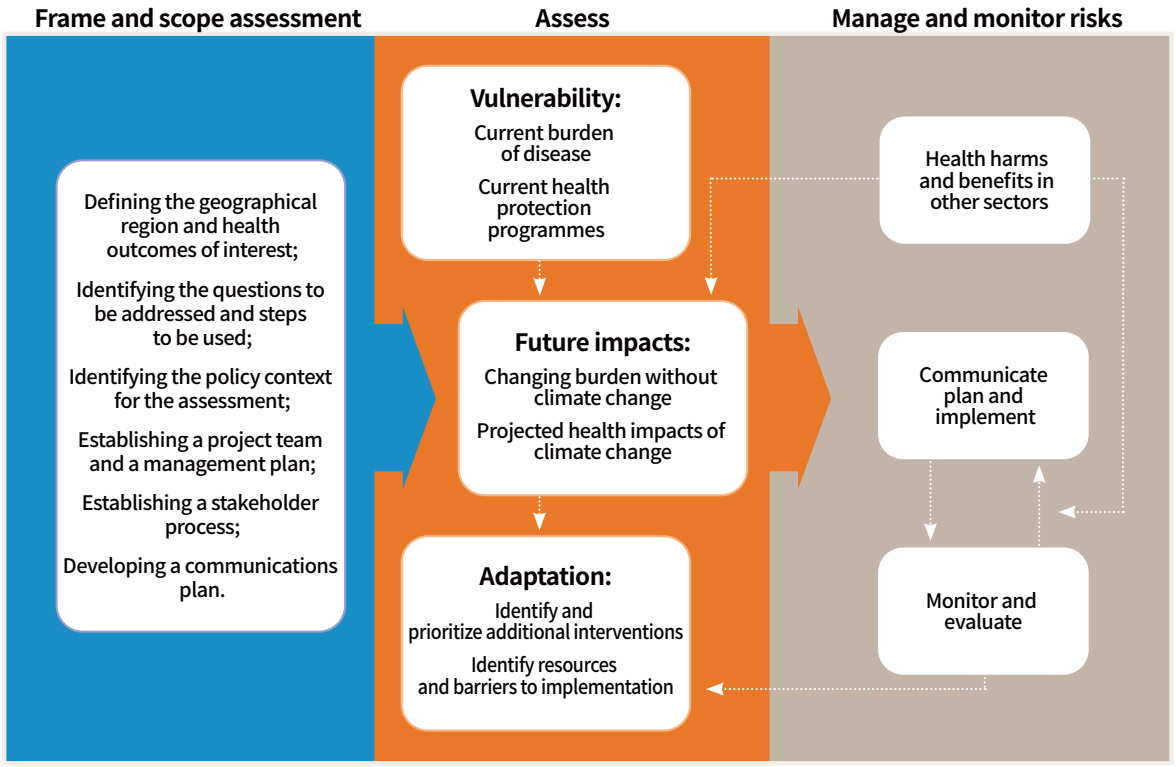
When conducting V&As, it is also beneficial to identify key stakeholders and establish cooperative relationships (See Figure V-2). A number of items that can be used as reference to support V&As and ensure equity in climate action, such as the WHO Checklist for Climate Change Vulnerability Assessment, are also available.*51

It is crucial that vulnerability in healthcare facilities is assessed. Climate change will result in floods, torrential rains, tropical cyclones, and extreme weather events that will have significant effects on operations at healthcare facilities. Healthcare facilities may also experience individual or combined effects from infectious diseases that are impacted by climate change or non-communicable diseases (NCDs) and other trauma related to climate change. According to the WHO, healthcare facility vulnerability consists of the following four components.

1. **Ensure facilities are staffed with sufficient numbers of well-trained, informed, and empowered personnel who can serve in safe and suitable working environments and are provided with support to respond to climate challenges**
2. **Manage water, sanitation, medical waste, and other aspects of operations in a safe and sustainable manner**
3. **Introduce sustainable energy services**
4. **Ensure healthcare facilities can function efficiently through management of infrastructure, technology, products, and processes**

Vulnerability assessments are conducted using checklists. By filling out those lists, personnel can determine vulnerability to climate-related disasters such as floods, storms, rising sea levels, heat waves, wildfires, and cold waves in terms of the four aspects described above.

Figure V -2 The Vulnerability And Adaptation Assessment process*52



*51 World Health Organization. (2021). Checklists to Assess Vulnerabilities in Health Care Facilities in the Context of Climate Change. World Health Organization (WHO). Retrieved March 18, 2024, from https://www.who.int/publications/i/item/9789240022904.

*52 World Health Organization. (2021). Quality Criteria for Health National Adaptation Plans. World Health Organization (WHO). Retrieved March 18, 2024, from https://www.who.int/publications/i/item/9789240018983.

Conducting vulnerability assessments of the health system in Japan may provide opportunities for health institutions, long-term care facilities, and businesses to re-evaluate BCPs, so they should be included as part of the process for creating adaptation plans in the health sector.

2) Reinforcing surveillance and establishing an integrated surveillance system that includes climate information

Establishing an integrated surveillance system that is based on climate information will be an important step in conducting surveillance for health outcomes for infectious diseases and NCDs that are sensitive to climate impacts. Monitoring prevalence, relevant indicators (animal health conditions, vector populations), and health outcomes will help to identify seasonal trends, methods of responding to variability in the climate or environment, geographic hotspots for diseases, and threats like emerging or re-emerging infectious diseases. Specifically, surveillance systems for heat stroke and infectious diseases must be reviewed and strengthened, and an integrated surveillance system that incorporates climate information must be established. Action must be taken to improve response capacity. Existing surveillance systems should be reassessed from the perspectives of climate risk and climate change countermeasures and an integrated surveillance platform that is linked to climate information should be established so a more strategic, comprehensive approach to adaptation measures can be introduced.

Strengthening surveillance

Regarding the topic of strengthening surveillance, we will begin with a discussion of heat stroke. Based on the concept of heat health proposed by the WHO and other organizations, we offer the following five recommendations for heat stroke surveillance from the perspectives of the health hazards of heat stroke, the range of health effects caused by heat stress, real-time surveillance, and early warning alerts.

1. **Based on an understanding that health hazards caused by heat stress are not limited to heat stroke, which is the concept of "heat & health" that has become more widespread overseas,*[53] establish a comprehensive surveillance system to identify health hazards of heat-related illnesses, including non-communicable chronic diseases that can be exacerbated by heat stress such as CVDs, respiratory diseases, and diabetes.**
2. **Health indicators monitored by heat stroke surveillance should not be limited to the number of ambulance transports or hospital admissions and the number of deaths recorded at fixed points. To provide a more accurate picture of the overall health hazards of heat stroke, these indicators should also include minor cases, such as the number of outpatient clinic visits. Furthermore, the indicator used to determine fatal heat-related health hazards should be number of excess deaths rather than number of actual deaths.**
3. **Conduct surveillance of heat stroke and heat-related illnesses as described in 1 and 2 in real time and publish or share surveillance information rapidly so the burden on health systems can be ascertained and so surveillance information can be linked to effective countermeasures.**
4. **Evaluate the degree to which current early warning alerts are effective in terms of heat indicator used and alert timing, levels, and units, and establish a more multifaceted, comprehensive, and effective early warning system.**
5. **Parties who are particularly vulnerable to heat stress and are officially labeled as "groups vulnerable to heat stroke" include elderly people; children; people with visual impairments; people with physical disabilities such as limb and trunk impairments; and people with intellectual or developmental disabilities. However, it does not include expectant mothers or people with mental disorders. Scientific knowledge on climate vulnerable groups should be accumulated and targeted adaptation measures should be developed.**

Heat stroke surveillance targets the number of ambulance transports and deaths due to heat stroke, but this is thought to be inadequate for fully capturing the health hazards of heat stress.*[54] The MHLW defines heat stroke as thermoregulation failure caused by prolonged exposure to high temperature and humidity. However, "heat-related illnesses" as described by the WHO and other organizations includes those directly caused by heat stroke as well as NCDs that occur as an indirect result of heat exposure.

Information for the number of ambulance transports for heat stroke is provided by the FDMA and MIC,*[55] while the MHLW provides data on hospitalizations and deaths. Figures for hospitalizations are determined through fixed-point heat stroke hospitalization reports

*53 Global Heat Health Information Network. (2024). Heat & Health. Global Heat Health Information Network. Retrieved March 18, 2024, from https://ghhin.org/heat-and-health/

*54 MHLW. (2023). Information about Heat Stroke – MHLW Health and Medicine. Retrieved March 18, 2024, from https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryou/kenkou/nettyuu/.

*55 FDMA. (2023). Heat Stroke Data – Heat Stroke Data. Retrieved March 18, 2024, from https://www.fdma.go.jp/disaster/heatstroke/post3.html.

from collaborating health institutions, while the number of deaths is determined using vital statistics of the population. These reports are currently being presented separately by these different agencies, so information regarding numbers of hospital transports, hospitalizations, and deaths for heat stroke is not being managed in a unified manner.

Furthermore, regarding surveillance coverage, statistics on outpatient visits without ambulance transport are unavailable, limiting the ability of the surveillance system to provide a full picture of heat stroke. As previously shown in Table V-3, some countries use the number of hospital visits and excess deaths as surveillance indicators. To identify heat-related health hazards in a comprehensive and accurate manner, it is likely that further consideration must be given to surveillance coverage. There are also differences between the early warning alerts for heat stroke used in Japan and the alert systems in other countries in timing, indicators, and units used. It may be desirable to verify the effectiveness of Japan's current system and consider revisions as necessary.

Establishing an integrated surveillance system that incorporates climate information

"Integrated surveillance" refers to the integration of multiple surveillance systems to make better use of information to detect, investigate, and mount appropriate responses to public health threats.*56 Specifically, it is a new type of disease surveillance in which epidemiological data on infectious diseases and heat stroke is integrated with climate and environmental information systems.

We offer the following two recommendations.

1. **Link and integrate climate information from the MOE and the JMA with surveillance systems for heat stroke and infectious diseases to establish a system that can generate scientific knowledge from the perspectives of climate and environmental epidemiology so effective adaptation measures for diseases affected by climate change can be formulated.**
2. **Adapt the alert system that issues early warnings based on climate information to the field of infectious disease to establish a mechanism for continuous monitoring of environmental conditions, timely communication and issuance of warnings, and early response.**

The communication of climate information is handled by the MOE and JMA, which conduct monitoring of Wet-Bulb Globe Temperature (WBGT), issue early warning alerts, and disseminate information to raise awareness. The MOE also analyzes the number of ambulance transports and heat index information provided by the MIC and FDMA.*57 Surveillance for infectious diseases is conducted using the National Epidemiological Surveillance of Infectious Diseases (NESID), which is an online central database managed by a private company under contract from the MHLW.*58

Heat stroke and infectious disease surveillance is currently managed independently at their respective administrative agencies and are not linked to climate information at JMA and NIES or to A-PLAT. Japan can establish an integrated surveillance system based on climate information by integrating various surveillance systems such as those for infectious disease and heat stroke to create a system capable of monitoring multiple diseases and linking that system to climate information. Taking such actions to reinforce surveillance will be an important step in creating appropriate projections for and responding to infectious diseases and NCDs that are impacted by climate change.

3) Emergency preparedness and response

Given its cross-sectoral nature, all sectors should implement initiatives for climate disaster prevention and mitigation. The MOE and the Cabinet Office have presented a strategy called, "Strategy of 'Climate Change × Disaster Prevention' in the Age of Climate Crisis" that aims to effectively coordinate prevention and mitigation measures for climate change and disasters and calls on all parties in each field to take comprehensive action for this objective (See Figure V-3).*59

*56 World Health Organization. (2021). Quality criteria for the evaluation of climate-informed early warning systems for infectious diseases. World Health Organization (WHO). Retrieved March 18, 2024, from https://www.who.int/publications/i/item/9789240036147.

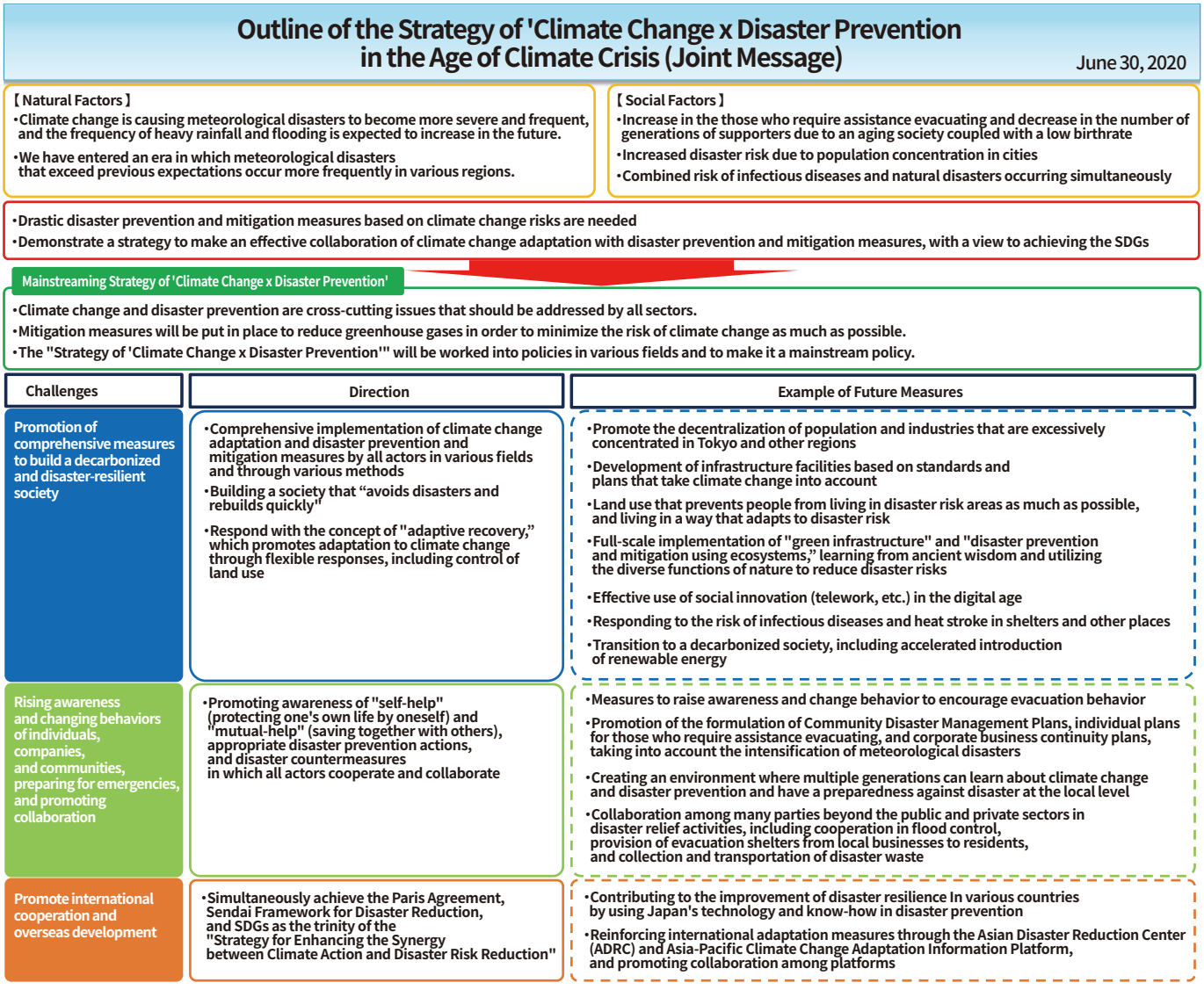
*57 MOE. (2023). Heat Stroke Prevention Information Site – Action Plan for Heat Stroke Prevention. Retrieved March 18, 2024, from https://www.wbgt.env.go.jp/heatillness_rma_ap.php.

*58 National Institute of Infectious Diseases. (2018). Infectious Disease Surveillance in Japan. Retrieved March 18, 2024, from https://www.niid.go.jp/niid/images/epi/nesid/nesid_ja.pdf.

*59 Cabinet Office. (2021). White Paper on Disaster Management 2021 – Special Feature: Chapter 2, Section 5, 5-2 "Strategy of 'Climate Change × Disaster Prevention' in Climate Risk Age: From Restoration to Adapted Reconstruction." Disaster Prevention Information - Cabinet Office. Retrieved March 18, 2024, from https://www.bousai.go.jp/kaigirep/hakusho/r03/honbun/0b_2s_05_02.html.

Considering this objective in the context of the healthcare sector, the concept of "Climate Change x Disaster Prevention" must be incorporated into the disaster health system and existing disaster countermeasures must be updated. This will require establishing a system that reflects a wide variety of disaster scenarios, including not only major accidents, earthquakes, and novel infectious disease outbreaks, but also those that are the result of extreme weather conditions such as floods, storms, and heat waves. Specifically, specialized training programs for professionals in disaster and infectious disease response who are dispatched when disasters occur (such as DMATs, JMATs, DPATs, and disaster medical nurses)*60 should cover climate disasters such as floods and heat waves alongside other potential major disasters to enhance their response capacities during the acute phases of disasters.*61 Moreover, accumulating knowledge on climate vulnerability described above in Section 1 may be useful for reinforcing disaster response capacity, such as when designing training programs and response measures based on specific situations that are likely to occur in the event of a disaster.

Figure V -3 Strategy of "Climate Change × Disaster Prevention" in the Age of Climate Crisis



*60 MHLW. (2023). FY2023 Regional Medical Care Visions Advisor Meeting – Regarding Disaster Support Nurses. 2023. Retrieved March 18, 2024, from https://www.mhlw.go.jp/content/10800000/001146146.pdf

*61 MHLW. (n.d.). "Disaster Healthcare." Retrieved March 18, 2024, from https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000089060.html.

VI

Mitigation measures:

Reducing health system GHG emissions

VI Mitigation measures: Reducing health system GHG emissions

1. GHG emissions in the health sector

GHG emissions throughout the health system supply chain are high, even among industrial sectors, and account for approximately 4.5% of global GHG emissions.*62 If the health sector were a country, it would be the world's fifth largest GHG emitter after China, the United States, India, and Russia,*63 and its emissions are equivalent to the emissions of 514 coal-fired power plants.*64 Focusing on just CO_2 among GHGs, emissions from health systems account for 4% to 5% of global CO_2 emissions.*65 Comparing the share of health system GHG emissions by country, the United States is the top emitter (8% to 9.8%), followed by China. Another study found that the highest contributions to the global healthcare carbon footprint came from the United States and China. As for health sector emissions as a percentage of each country's climate footprint, the United States (7.6%) and Switzerland (6.7%) were higher.*66

In Japan, GHG emissions from the health system were estimated to have accounted for 4.6% of total emissions in 2011,*67 but depending on the study, this figure was as high as 6.4%.*68 Some studies also pointed out that in 2015, annual CO_2 emissions increased alongside growth in healthcare expenditures.*69 By international standards, GHG emissions from Japan's health system are high. After the United States, China, and the EU, Japan's health system ranks fourth in CO_2 emissions, while it ranks third in the world in terms of share of the national carbon footprint, after the United States and Switzerland.*70

Within this context, it is unlikely that GHG emissions from Japan's health system will decrease naturally. Population aging, increasing prevalence of chronic NCDs, and rapid urbanization have all been suggested to contribute to increased healthcare demand,*71*72*73 and as healthcare demand grows, GHG emissions are likely to increase. Compared to other OECD countries, Japan has more hospital beds per 1,000 population as well as longer hospital stays. It is also on the higher end for the number of outpatient visits per capita.*74*75*76 Structural characteristics such as these lead to greater healthcare demand that may contribute to Japan having one of the highest levels of GHG emissions, mentioned above.

Action must be taken to advance proactive mitigation measures, starting with the reduction of GHG emissions from health systems, including that of Japan.

*62 Health Care Without Harm. (2019). HEALTH CARE'S CLIMATE FOOTPRINT. noharm-global.org. https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf.

*63 See footnote 62.

*64 USEPA Greenhouse Gas Equivalencies Calculator. Calculated 8/8/19

*65 Watts, N., Amann, M., Arnell, N., Ayeb-Karlsson, S., Beagley, J., Belesova, K., ... & Costello, A. (2021). The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises. The lancet, 397(10269), 129-170. https://doi.org/10.1016/S0140-6736(20)32290-X.

*66 See footnote 62

*67 Nansai, K., Fry, J., Malik, A., Takayanagi, W., & Kondo, N. (2020). Carbon footprint of Japanese health care services from 2011 to 2015. Resources, Conservation and Recycling, 152, 104525. https://doi.org/10.1016/j.resconrec.2019.104525.

*68 See footnote 62.

*69 See footnote 67.

*70 See footnote 62.

*71 Ageing and health. (2022). World Health Organization (WHO). Retrieved March 18, 2024, from https://www.who.int/news-room/fact-sheets/detail/ageing-and-health.

*72 Wang, Y., & Wang, J. (2020). Modelling and prediction of global non-communicable diseases. BMC Public Health, 20(1), 822. https://doi.org/10.1186/s12889-020-08890-4

*73 Future of health and healthcare provision in cities. (2016). GOV.UK. Retrieved March 18, 2024, from https://assets.publishing.service.gov.uk/media/5a7f8b7e40f0b62305b87cb6/gs-16-15-future-of-cities-health-healthcare-provision.pdf.

*74 OECD (2023). Health at a Glance 2023. OECD. Retrieved March 18, 2024, from https://www.oecd.org/health/health-at-a-glance/.

*75 OECD (2023). Length of hospital stay. https://data.oecd.org/healthcare/length-of-hospital-stay.htm.

*76 OECD (2023). Doctors' consultations. https://data.oecd.org/healthcare/doctors-consultations.htm#indicator-chart.

2. Current mitigation policies in Japan

In this section, we will provide an overview of Japan's main mitigation policies. The main focus of the Strategic Energy Plan, which is Japan's basic plan for energy, is responding to climate change. Japan is also implementing a number of individual policies in line with the "Green Growth Strategy Through Achieving Carbon Neutrality in 2050."

1) The Strategic Energy Plan

The Strategic Energy Plan was formulated by the Agency for Natural Resources and Energy and is the basic plan for energy in Japan. Efforts to formulate its sixth version are currently underway. It positions climate change as one of its main focuses and outlines necessary actions for industry, businesses, households, and the transportation sector to take to achieve net zero by 2050.

FigureVI-1 Excerpt from the Sixth Strategic Energy Plan

Points of the policy responses towards 2030 [Basic Plan]

- The major principal of the energy policy is to **first and foremost ensure stable supply,** and **realize low cost energy supply by enhancing its efficiencyon the premise of safety.** It is also important to make maximum efforts to **pursue environment suitability(S+3E).**

Points of the policies towards 2030 [Demand side's efforts]

- Further pursuit of **thorough energy efficiency improvement**
  - ➢ **In the industrial sector,** the index and the target valuesof **the Benchmark Program will be reviewed** to urge business operators to improve their energy efficiency, **the development and the introduction of energy efficient technologies** will be promoted under the new "Energy Efficient Technological Strategies".
  - ➢ **In the commercial and residential sectors, mandating to meet and enhancing the energy efficiency standards based on the Act on the Improvement of Energy Consumption Performance of Buildings,** and **strengthening the Top Runner equipment/building material standards** will be addressed, in order to enable new housings and buildings built from 2030 to meet ZEH/ZEB efficiency standards.
  - ➢ **In the transport sector,** the introduction and dissemination of **electrified vehicles and its infrastructure** will be promoted and **the electrified vehicle-related technologies (e.g. batteries) and supply chains** will be enhanced, **the applications of AI and IoT** will be promoted to encourage the collaboration of shippers and carriers **for overall optimization of freight transportation.**
- Consideration of **new systems to encourage energy transition on demand side**
  - ➢ **The amendment of the Act on the Rationalization etc. of Energy Use,** which is aimed at rational use of fossil energies, will be considered. In the new system, **the rationalization of overall energy consumption** including non-fossil energies and **the enhancement of non-fossil energies** will be promoted in parallel.
    - → New framework will be established to assess business operators who **enhance the usage rate of non-fossil energies** or **optimize their energy demand in response to the fluctuation of energy supply.**
- **Sophistication of the secondary energy structure** including effective use of distributed energy resources such as batteries
  - ➢ **Aggregation businesses utilizing distributed energy resources** such as storage batteries will be promoted; and **efficient energy use, enhanced resilience and activation of the local community** by local production for local consumptionwill be promoted **by microgridimplementation.**

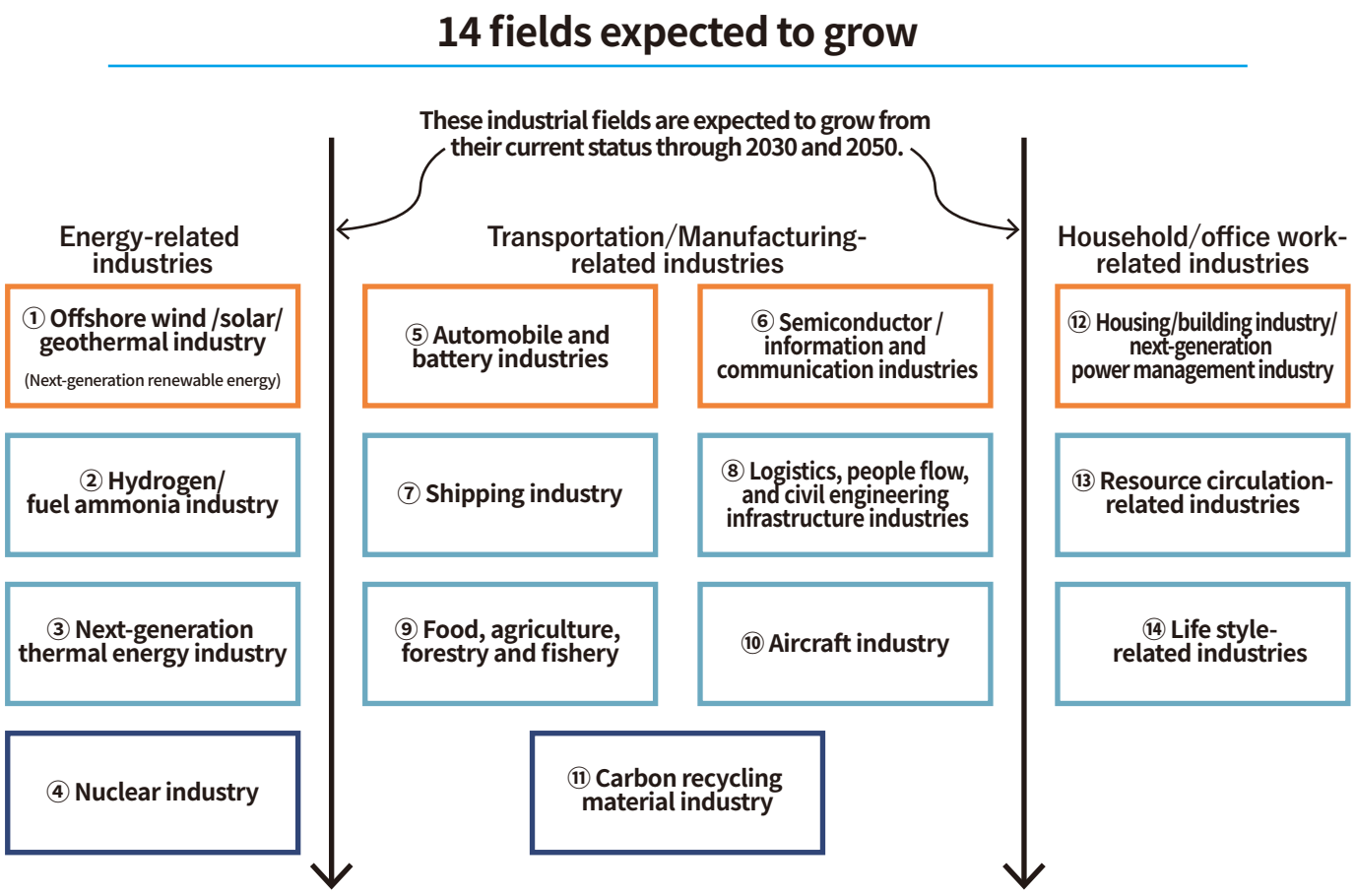
2) The Green Growth Strategy Through Achieving Carbon Neutrality in 2050

In a policy speech made on October 26, 2020, then-Prime Minister Suga announced that Japan will aim to achieve a net zero society by 2050. Based on that declaration, the Green Growth Strategy Through Achieving Carbon Neutrality in 2050 was formulated later that year, in December. That strategy designated 14 areas as essential priority areas for achieving net zero and clearly stated that it will direct various industrial policies to create a "virtuous cycle in the economy and the environment."

3) The GHG Accounting and Reporting System*77

The Act on Promotion of Global Warming Countermeasures (hereinafter referred to as the "Global Warming Prevention Act") obligates certain businesses (referred to as "specified emitters") to calculate, report, and disclose their GHG emissions. "Specified emitters" include companies whose total energy consumption across all locations of business is 1,500 kl/year or more, as well as freight forwarders, shipment companies, and other such companies designated by the Act on Rationalization of Energy Use and Shift to Non-fossil Energy (hereinafter referred to as the "Energy Conservation Act").

FigureVI-2 Excerpt from the "Green Growth Strategy Through Achieving Carbon Neutrality in 2050," Ministry of Economy, Trade and Industry et al.



*77 MOE. (n.d.). "System Overview: The GHG Accounting and Reporting System Website." The GHG Accounting and Reporting System. Retrieved March 18, 2024, from https://ghg-santeikohyo.env.go.jp/about.

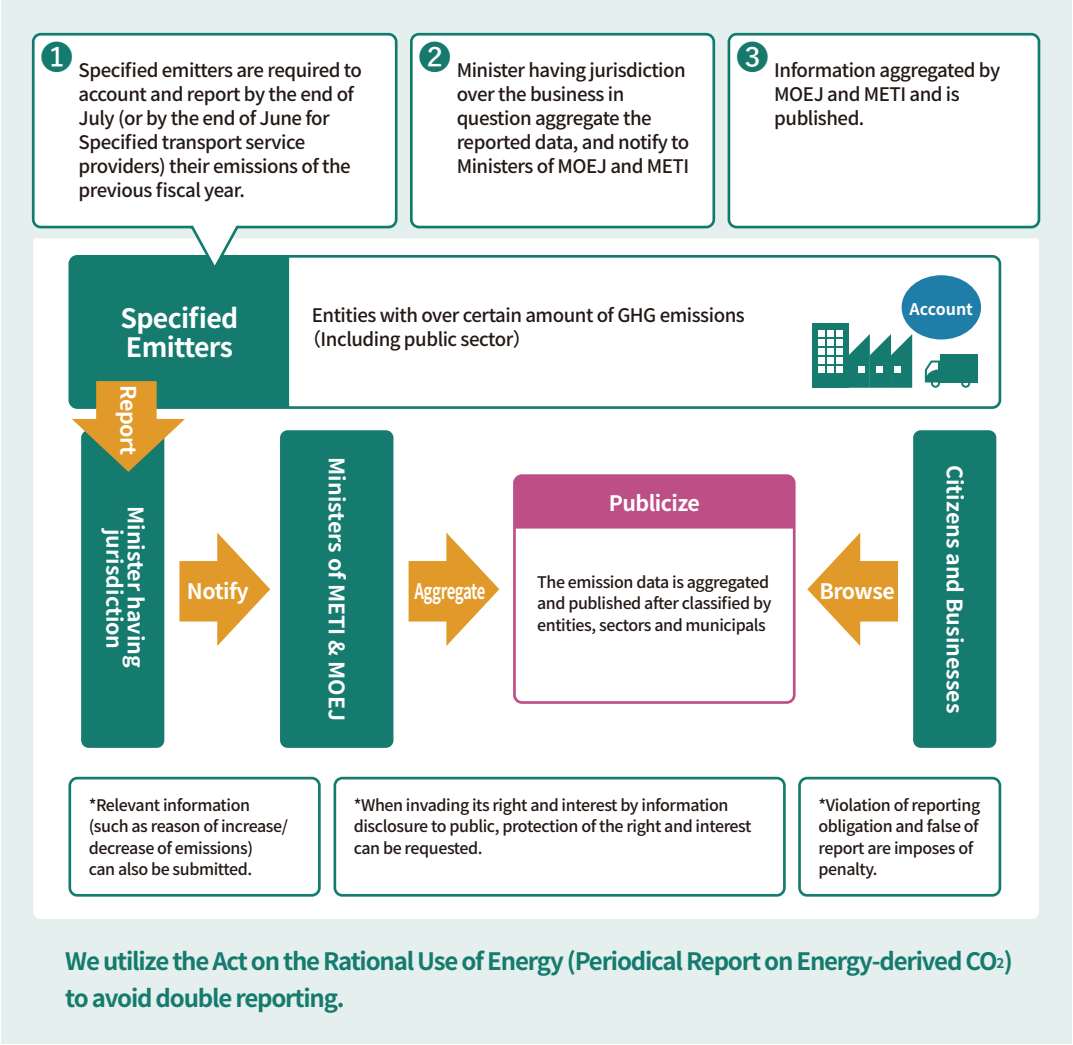
Emissions accounting is conducted by selecting activities that emit specific GHGs (energy-derived CO_2, non-energy-derived CO_2, methane, nitrous oxide, etc.) and calculating emissions for each activity. Total emissions are then converted into units of CO_2.*78

In the emissions reporting system, periodic reports made in accordance with the Energy Conservation Act or GHG accounting reports made under the Global Warming Prevention Act are submitted to the minister with jurisdiction over the business in which companies operate. Each fiscal year, these reports are due by the end of July for businesses and by the end of June for transportation companies.

Failure to submit a report or falsifying a report is punishable by fines of up to 200,000 yen.

The ministers with jurisdiction over each business are required to share the reported emissions to the Minister of the Environment and the Minister of Economy, Trade and Industry, who must then compile and publish the results. Detailed findings from these reports are published every fiscal year on the MOE's website.*79 There is also a system in place that allows business operators to submit requests of disclosure to the ministry or agency with jurisdiction over their business.

FigureVI-3 MOE. "The GHG Accounting and Reporting System." (https://ghg-santeikohyo.env.go.jp/about)



We utilize the Act on the Rational Use of Energy (Periodical Report on Energy-derived CO_2) to avoid double reporting.

*78 MOE. (2023). Supply Chain Emissions Overview – The Green Value Chain Platform. Retrieved March 18, 2024, from https://www.env.go.jp/earth/ondanka/supply_chain/gvc/estimate.html.

*79 See footnote 76.

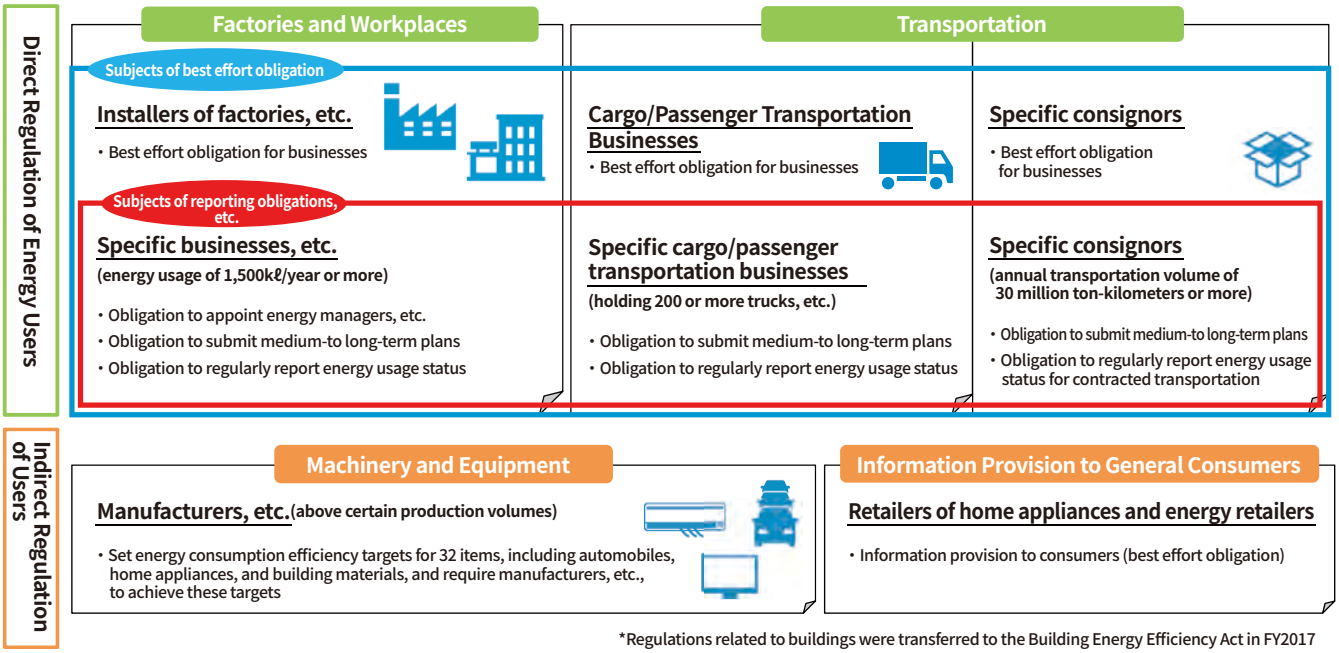
4) Systems for encouraging the efficient use of energy

The Energy Conservation Act obligates certain business operators with high energy consumption to formulate and implement plans for improving the efficiency of their energy use. Specified business operators must submit annual reports on their own energy use and the status of their efforts to conserve energy. There are also efficiency standards for energy consumption that products and equipment must meet.

5) MHLW Follow-up meetings for the Action Plan for a Low Carbon Society

In 2016, the Government formulated the "Plan for Global Warming Countermeasures." It states that GHG emission reduction plans voluntarily formulated by the private sector in accordance with that plan as well as the corresponding initiatives that are launched will be subject to rigorous and regular evaluation and verification by councils and other bodies. Based on that plan, the MHLW is evaluating and following initiatives taken under action plans for a low-carbon society from industry associations under its jurisdiction. These include the Japan Consumers' Co-operative Union, the Japan Federation of Pharmaceutical Manufacturers' Associations, and private hospital associations. Once per year, the MHLW holds follow-up meetings for the Action Plan for a Low Carbon Society, which conducts hearings with the three aforementioned parties to compile a report.*80 The 5th Follow-Up Meeting for the Action Plan for a Low Carbon Society was held on July 10, 2023 and a report summarizing the content and evaluations was released later that year, on December 15.*81

FigureVI-4 Excerpt from the Agency for Natural Resources and Energy website "Overview of the Energy Conservation Act"*82



*Regulations related to buildings were transferred to the Building Energy Efficiency Act in FY2017

*80 MHLW. (2023). "Follow-up meetings for the Action Plan for a Low Carbon Society." https://www.mhlw.go.jp/stf/shingi/other-roudouseisaku_516282.html.

*81 MHLW. (2023). "Regarding Follow-up on Action Plans for a Low Carbon Society from Industry Associations Under MHLW Jurisdiction (Report)." https://www.mhlw.go.jp/content/001179321.pdf.

*82 Agency for Natural Resources and Energy (2019) "Overview of the Act on Rationalizing Energy Use" Retrieved April 15, 2024 https://www.enecho.meti.go.jp/category/saving_and_new/saving/summary/pdf/20181227_001_gaiyo.pdf

3. Desirable mitigation measures for Japan's health system

Based on current circumstances and existing policies described in Sections 1 and 2 above, we offer the following four recommendations as specific mitigation measures for Japan's health system.

A) All stakeholders should recognize the fact that the health sector accounts for a high percentage of GHG emission as a shared challenge
B) The Government should set specific GHG reduction targets for the health system and present concrete GHG accounting methods
C) The Government should define priority areas that require specific attention and present a menu of concrete mitigation measures that should be taken in each area
D) In discussions on health system sustainability, include discussions on the nature of supply and demand for health services from the perspective of the environment.

A) All stakeholders should recognize the fact that the health sector accounts for a high percentage of GHG emission as a shared challenge

As mentioned above, health system GHG emissions account for about 5% of Japan's total emissions, and despite the likelihood of greater future demand for healthcare and long-term care services due to population aging, the health system has little presence in government mitigation measures. For example, the health sector is not included in the 14 areas of the Green Growth Strategy (discussed above), and the MHLW is not one of the ministries and agencies that participated in that Strategy's formulation. The MHLW oversees the activities of industry associations at follow-up meetings for the Action Plan for a Low Carbon Society through hearings on action plans that they have formulated in accordance with that Plan. However, these hearings are conducted so the MHLW can summarize a report on its findings once per year, and it has not yet introduced policies that emphasize the health system.

Therefore, to serve as the starting line for mitigation measures, it will be important for all stakeholders, including the Government, health institutions, private organizations, and civil society to share two points related to current circumstances and challenges: (1) as an industrial sector, the health sector accounts for a high percentage of total GHG emissions; and (2) compared to other countries, Japan's health sector accounts for a relatively large proportion of national GHG emissions.

B) The government should set specific GHG reduction targets for the health system and present concrete GHG accounting methods

As discussed previously, in addition to general Scope 1, Scope 2, and Scope 3 methods of calculating GHG emissions, certain industries have specific guidelines on reducing GHG emissions. The GHG Accounting and Reporting System is currently in operation under those guidelines. However, Japan's health system involves a variety of stakeholders because it is located upstream in the supply chain of products and services compared to other industries. Consequently, if the supply chain is included, then conducting GHG emissions accounting for healthcare institutions on a per-institution basis is no simple matter. Despite this and other characteristics of the health system, guidelines for healthcare and long-term care facilities to use to calculate emissions have yet to be formulated, and a database on medical information and GHG emissions to support such efforts has yet to be established.

Given these circumstances, the government should intervene in the health system in a more proactive manner that goes beyond monitoring. In concrete terms, specific reduction targets for the health system should be set, and guidelines and other information resources on measurement methods that take the characteristics of the sector into account should be developed.

When establishing methodologies for measuring emissions of individual GHGs, it is preferable that emissions are calculated for the entire supply chain while referring to the Scope 1, Scope 2, and Scope 3 categories described in the GHG Protocol.*83*84 Specific ranges must be indicated to help businesses calculate Scope 3 emissions. This includes the production and transportation of the goods and services

*83 World Resources Institute. GHG Protocol: Homepage. https://ghgprotocol.org.
*84 For a detailed explanation, see footnote 74.

they purchase (pharmaceuticals, medical supplies etc.), waste disposal, and employee commutes. For example, in the UK, the NHS has introduced its own carbon footprint systems called NHS Carbon Footprint and NHS Carbon Footprint Plus.*85 The latter incorporates health system-specific GHG emissions that are outside the scope of the GHG Protocol, such as hospital commutes for patients and visitors.

C) The government should define priority areas that require specific attention and present a menu of concrete mitigation measures that should be taken in each area

When investigating and providing a menu of concrete mitigation measures, it would be ideal to first identify all sources of GHG emissions so stakeholders could then focus on reducing emissions from those sources. However, climate change is an urgent issue that must be addressed under time constraints, and human and material resources in the health sector are limited. It will be more efficient to identify areas where GHG emissions are notably large to examine targeted mitigation measures. In fact, a number of national strategies in other countries mentioned above include lists of examples of items that require mitigation measures.

D) In discussions on health system sustainability, include discussions on the nature of supply and demand for health services from the perspective of the environment

As stated earlier, initiatives from industry associations in the health system are being monitored by the MHLW. However, in the midst of these efforts to reduce GHG emissions, we seem to be overlooking the question of whether the methods of operating healthcare services may themselves be contributing to higher GHG emissions. Other countries' mitigation measures include reducing the demand for health services by promoting preventive care, which is inextricably linked to reducing the amount of health services provided. While discussions on supply and demand have been held within the context of health system sustainability both in terms of financial and human resources, discussions on how supply and demand relate to climate change have yet to take place.

Therefore, when discussing health system sustainability, the government must include discussions with the theme of potential methods of operating health services in a manner that reduces supply and demand from the perspective of environmental impact. When holding such discussions, it will also be necessary to point out the need for health system stakeholders to be proactive about mitigation rather than passively adopting mitigation measures outlined by the Government. This may include actively participating in formulating the Strategic Energy Plan and other measures, or by investigating efficient methods of providing health services.

4. Key areas for reducing GHG emissions

Using national strategies and papers on decarbonizing health systems from overseas as reference, we have identified a number of items that could be set as priority areas in advance for recommendation (C) described above. This list is provided below, along with an overview of specific mitigation measures. Specifically, these four areas are (1) healthcare facilities and equipment; (2) transportation and movement; (3) drugs and medical gases, and (4) waste.

Healthcare facilities and equipment

Healthcare facilities are more energy intensive than facilities in other sectors, so proactively reducing GHG emissions from healthcare facilities will be highly significant. For example, in the United States, large hospitals (200,000 square feet and above) account for 5.5% of the total delivered energy used by the commercial sector.*86 Electricity consumption represents a significant source of emissions for hospitals, with lighting, cooling, and ventilation accounting for almost three-quarters of total consumption.*87 Furthermore, GHGs emitted when building hospitals and other such facilities account for 15% of health system GHG emissions. It is likely that GHG emissions in Japan's health sector follow a similar pattern, making this an urgent issue to address.

Generally speaking, specific measures for facilities and equipment fall into two categories: (1) introducing low-carbon construction methods and materials and (2) implementing low-carbon building operating practices.

For category (1), total emissions from facilities can be reduced by designing buildings for greater energy efficiency, introducing

*85 See footnote 30.

*86 Bawaneh, K., Ghazi Nezami, F., Rasheduzzaman, M., & Deken, B. (2019). Energy consumption analysis and characterization of healthcare facilities in the United States. Energies, 12(19), 3775. https://doi.org/10.3390/en12193775.

*87 Vinoth, P., Obeidat, A., Al-Kindi, S., Jain, V., Jabbari-Zadeh, F., Lui, M., ... & Khetan, A. (2022). Toward a Net-Zero Health Care System: Actions to Reduce Greenhouse Gas Emissions. NEJM Catalyst Innovations in Care Delivery, 3(6).

recycling-oriented construction methods, and using sustainable materials and energy sources.*88 As for specific methods of reducing total emissions, they may include promoting green buildings or implementing green building-related certification systems, devoting more effort to designing for energy efficiency, using low-carbon materials, and leveraging tools to assess the environmental performance of buildings.

With regard to category (2), low-carbon building operations will be a key method of reducing the operating costs and environmental impacts of healthcare facilities. This includes introducing lighting controls and using LEDs, installing more energy-efficiency equipment, and implementing strategies to reduce energy demand.*89 These measures will be especially effective in operating rooms and other areas where energy consumption is highest. Improving the energy efficiency of heating systems in healthcare facilities will also be important. Adopting more energy-efficiency heating systems will make it possible to provide some of the energy needed for hot and cold water systems using renewable energy sources.*90 A suitable source of this renewable energy may be solar power.

Transportation and movement

The transportation sector accounts for 15% of global GHG emissions. Road vehicles account for 70% of these emissions, followed by aviation (12%), shipping (11%), and rail (1%). In the United Kingdom, approximately 3.5% of all road travel in England is related to NHS patients, visitors, staff, and suppliers, and transportation is estimated to account for 14% of total GHG emissions in the health sector.*91

We can divide measures for transportation and movement into (1) the development and introduction of low-carbon means of transportation and mobility and (2) the reduction of transportation and mobility.

Introducing electric vehicles (EVs) and hybrid vehicles is one method of achieving measure (1). For EVs in particular, fewer EVs are sold in Japan compared to other developed countries, and their domestic use is not increasing.*92 To facilitate the introduction and widespread adoption of EVs, infrastructure that enables their easy use must be established. Studies have also shown that encouraging more patients and healthcare workers to switch to cycling or walking results in far fewer GHGs emissions than commuting by car,*93 and the WHO recommends doing so.*94

Regarding measure (2), further progress should be made in disseminating online medical examinations. Utilizing online medical examinations can improve patient healthcare access while reducing GHG emissions. One study reported that from 2019 to 2021, the increase in online medical examinations led to a 36% decrease in GHG emissions from clinic visits.*95 We should also review the formats used to hold academic conferences and meetings.*96 The lifestyles of health professionals often involve a lot of travel, especially for physicians. For example, the travel involved in a single major academic conference emitted about as much CO_2 as an entire city emits in one week.*97 Options for reducing this travel-induced carbon footprint may include holding conferences at venues that do not require health professionals to travel long distances to access, adopting formats that allow attendees to participate remotely, and shifting annual conferences to biennial schedules.

*88 Health Care Without Harm. (2021). The Road Map. Health Care Climate Action. https://healthcareclimateaction.org/roadmap.

*89 HEALTH CARE'S CLIMATE FOOTPRINT. (2019). noharm-global.org. https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf.

*90 Al-Rawi, O. F., Bicer, Y., & Al-Ghamdi, S. G. (2023). Sustainable Solutions for Healthcare Facilities: Examining the Viability of Solar Energy Systems. Frontiers in Energy Research, 11, 1220293.

*91 See footnote 30.

*92 DeNA. (2023, June 23). "Why aren't EVs becoming popular in Japan? New tech addresses concerns toward range and battery performance." DeNA. Retrieved March 18, 2024, from https://dena.com/jp/story/57/.

*93 Mizdrak, A., Cobiac, L. J., Cleghorn, C. L., Woodward, A., & Blakely, T. (2020). Fuelling walking and cycling: human powered locomotion is associated with non-negligible greenhouse gas emissions. Scientific reports, 10(1), 9196.

*94 World Health Organization. (2022). News. Cycling and walking can help reduce physical inactivity and air pollution, save lives and mitigate climate change. Retrieved January 14, 2024, from https://www.who.int/europe/news/item/07-06-2022-cycling-and-walking-can-help-reduce-physical-inactivity-and-air-pollution--save-lives-and-mitigate-climate-change.

*95 Thiel, C. L., Mehta, N., Sejo, C. S., Qureshi, L., Moyer, M., Valentino, V., & Saleh, J. (2023). Telemedicine and the environment: life cycle environmental emissions from in-person and virtual clinic visits. NPJ Digital Medicine, 6(1), 87.

*96 Klöwer, M., et al. (2020). An Analysis of Ways to Decarbonize Conference Travel after COVID-19. Nature Publishing Group UK. July 15, 2020. https://doi.org/10.1038/d41586-020-02057-2.

*97 See footnote 95.

Drugs and medical gases

Global total emissions from the pharmaceutical industry exceed those of the automotive industry. In the United Kingdom, pharmaceuticals are reported to account for up to a quarter of NHS GHG emissions across Scopes 1, 2, and 3.*98 It has been reported that only a few medicines account for most of these GHG emissions, and anesthetic gases and inhalers have been identified as areas of focus.

This means specific mitigations must be investigated for GHG emissions from the use of (1) anesthetic gases and (2) pressurized metered-dose inhalers (pMDI).

Regarding item (1), the anesthetic gases used in surgery are potent GHGs. For example, the emissions from a bottle of desflurane, a highly carbon-intensive anesthetic gas, are equivalent to the emissions of burning 440 kg of coal. Twenty-year global warming potential (GWP (20)) values are 3,714 for desflurane, 1,401 for isoflurane, and 349 for sevoflurane, so there is great variance in the greenhouse impact of anesthetic gases. It will be necessary to switch to these anesthetic gases and inhaled anesthetics with lower GHG emissions. It is worth noting that desflurane will be banned in the United Kingdom as of April 2024 and in the EU as of January 1, 2026.

As for (2) pMDIs, they are used to manage a variety of respiratory diseases ranging from asthma to COPD. Since most of pMDI emissions come from their propellants, switching propellants with lower GWPs will reduce GHG emissions.
This means it will be important to transition to pMDIs that use lower GWP propellants.

Waste

As the treatment of wastewater and medical waste at healthcare facilities consumes energy and generates CO_2 and other GHGs, it contributes to the carbon footprint. Incineration is the only process allowed for medical waste disposal in Japan, so some are concerned that domestic waste disposal emissions are higher than other countries.

Mitigation measures for waste disposal include (1) reviewing disposal methods and (2) waste reduction.

Regarding (1) disposal methods, Japan could consider adopting methods of disinfecting waste using pressurized steam, microwaves, or chemicals. Such methods would lead to lower GHG emissions than incineration. For waste that requires incineration, using modern, more efficient incinerators with energy recovery systems will help control GHG emissions.

With respect to (2) waste reduction, one option may be to select and procure environmentally-friendly medical supplies or equipment made from recycled materials or that are designed for easy recycling or reprocessing. Another option may be to encourage the reuse of recyclable goods. Such measures would reduce the volume of waste generated, which in turn would reduce GHG emissions from disposal.

*98 See footnote 30.

3. Transform care models and review the institutional design of incentives

Prevention activities and related efforts that reduce healthcare demand and associated CO_2 emissions will be essential for addressing climate change. These include initiatives from primary to tertiary prevention as well as for improving individual and population health. This is also aligned with the direction in which we aim to determine how to best achieve high quality, efficient health services that result in desirable health outcomes. Based on this point of view, reviewing supply and demand of healthcare as a health system mitigation measure does not conflict with measures the MHLW aims to enact to reform the healthcare provision system by 2040. These include measures such as Regional Medical Care Visions, work style reform for physicians and healthcare professionals, and measures to effectively address the uneven distribution of physicians.*99*100 Rather, it is something that should be advanced at the same time. However, in terms of resources, it will be difficult to accomplish these initiatives while only relying on self-supported efforts from healthcare professionals and healthcare institutions. This means that in addition to further advancing the care model transition for health services, it will also be necessary to consider policy-level initiatives. This can be achieved through initiatives such as shifting from cost-focused payment models, including those based on fee-for-service and Diagnosis Procedure Combination, other comprehensive payments, to Pay for Performance (P4P), in which compensation is determined based on care quality,*101*102 or encouraging the development of a new incentive model in the medical fee payment system.

Specific mitigation measures include reducing CO_2 emissions per outpatient visit as well as the total number of outpatient visits. Efforts to reduce CO_2 emissions per visit begin with identifying which healthcare services are essential for diagnosis and treatment and which are excessive for the targeted health outcome. Specifically, there are methods for sorting healthcare options in a sensible manner such as "Choosing Wisely," which began in the United States.*103 It includes evaluating the cost-effectiveness of routine medical practices from the perspective of health outcomes. To reduce the total number of visits, it is essential to first define indicators related to health outcomes, including patient-reported outcomes.*104 Once indicators have been defined, the appropriate number of visits and the best methods of utilizing health services to achieve those indicators can be determined.

According to the OECD, in Japan, the number of doctors' consultations per year per capita has been steady at 11.1 consultations per year, much higher than the OECD average.*105 Since each visit includes the provision of medical treatment as well as energy use and patient transportation, we can assume there is a positive correlation between the number of consultations and CO_2 emissions.

Specific methods of addressing this issue include promoting refillable prescriptions and making full use of online medical examinations. The system for refillable prescriptions was introduced in 2022 and allows physicians to dispense three visits' worth of prescriptions at a time for patients with stable symptoms. The use of online medical examinations will also be effective for reducing the total number of patient visits. Evidence that online medical examinations are safe and effective is gradually accumulating and, if they are used properly, encouraging people to make greater use of these examinations will help lower the number of patient visits and reduce CO_2 emissions. Bringing the high average per capita number of consultations in Japan in line with other countries that have achieved universal health coverage will require promoting systemic change in the health system while maintaining the quality of medical care and gaining stakeholder understanding.

*99 MHLW Health Policy Bureau. "Regarding the Healthcare Provision System." https://www.soumu.go.jp/main_content/000648340.pdf.

*100 MHLW Health Policy Bureau Medical Affairs Division. (2023). "Regarding Work Style Reform for Physicians." Retrieved March 18, 2024, from https://www.mhlw.go.jp/content/10800000/001129457.pdf.

*101 Kamesawa, A. (2022). Medical service fee reimbursement systems in each country. Retrieved March 18, 2024, from https://dl.ndl.go.jp/view/download/digidepo_12139809_po_1178.pdf?contentNo=1.

*102 Porter, M. E., & Teisberg, E. O. (2006). Redefining health care: creating value-based competition on results. Harvard business press.

*103 Cassel, C. K., & Guest, J. A. (2012). Choosing wisely: helping physicians and patients make smart decisions about their care. Jama, 307(17), 1801-1802. doi:10.1001/jama.2012.476.

*104 Deshpande, P. R., Rajan, S., Sudeepthi, B. L., & Nazir, C. A. (2011). Patient-reported outcomes: a new era in clinical research. Perspectives in clinical research, 2(4), 137-144. 10.4103/2229-3485.86879

*105 OECD. (2023). "Health at a Glance 2023." Retrieved March 2 2024. from https://www.oecd.org/health/health-at-a-glance/.

VII

Necessary elements for providing policies with strong backing

Ⅶ Necessary elements for providing policies with strong backing

1. Establishing leadership and governance

Strong government leadership that aims to achieve environmental sustainability will be vital for building climate response capacity and a low carbon health system.

As mentioned in Chapter Ⅰ, countries that participated at COP26 in 2021 pledged to build sustainable health systems. The Government of Japan has yet to endorse this pledge or join the Alliance for Transformative Action on Climate and Health (ATACH), which was established as a platform to support efforts in pursuit of that commitment. In other words, it seems that the Government of Japan has fallen behind international trends in climate change and health.

Now is the time for the Government to express its commitment to a carbon neutral health system and its pledge to achieve net zero as well as to provide leadership and governance to put these efforts into action. It will also be essential to formulate health system-specific adaptation measures, to present a roadmap for mitigation measures that will lead to a carbon-neutral health system, and to place health at the center of climate change action and protect the health of the Japanese people through intersectoral collaboration. The demonstration of accountability on the part of the government and related administrative bodies will be indispensable for effective and efficient governance.

Specific actions for achieving these objectives are described below.

Leadership and governance

- **Express a commitment to building a carbon neutral health system and strongly support health sector climate action by joining ATACH**
- **Establish a body for developing and executing strategies to address climate change in the health sector through collaboration centered on the MHLW, MOE, and other related ministries and agencies, and work across sectors to formulate and implement concrete action plans for adaptation and mitigation**

Necessary policies

- **Conduct vulnerability assessments at the national, regional, and institutional levels and formulate adaptation strategies that focus on the health sector**
- **Develop a decarbonization roadmap for building a low carbon health system to achieve net zero by 2050**
- **Review health sector programs related to climate change to incorporate medium- and long-term perspectives and set a direction that is more comprehensive and inclusive**

2. Education and capacity building for healthcare professionals

Healthcare professionals will be the key to successfully creating a climate resilient and sustainable health system. While approximately 80% of physicians believe that climate change is affecting the health of people in Japan,*106 only around 30% are taking action for climate change in their routine medical practice, such as by advising patients or engaging in advocacy. When asked about why they are unable to take such actions, reasons include lack of knowledge, time, and resources. Education and capacity building are one necessary solution for this issue. To achieve this, it will be essential to define the competencies required of healthcare professionals; to foster accurate understanding of climate change through undergraduate education, specialized training, lifelong learning, mentoring, and other educational opportunities; to support necessary health interventions and decision-making; and to foster and develop capacity to enable effective research interventions and evaluations of climate change.

It is likely that the educational needs of physicians, nurses, and other professionals who serve on the frontlines of healthcare will vary depending on the pathways through which climate change affects health. It will be necessary to enable them to respond flexibly to changes in healthcare demand that occur due to climate change, and meeting those needs may require alternative methods of providing care or establishing innovative care models. Securing a stable supply of trained health professionals is a critical issue, especially in remote areas or areas facing shortages in human resources. This means extreme weather events and similar crises can easily cause the health system to lose capacity and its ability to remain sustainable.

*106 HGPI. (3 December 2023). “Survey of Japanese Physicians Regarding Climate Change and Health.” https://hgpi.org/research/cop28-survey.html. Accessed 10 March 2024.

Necessary competencies that should be developed among healthcare professionals include correct understanding of information related to climate change; the use of said information in health interventions and decision-making or when designing and conducting research, evaluations, and interventions; and effectively managing health and health system-related climate risks.

Specifically, they require the knowledge and skills to properly address climate-related health risks; capacity building and environments to take appropriate action to reduce GHG emissions; and information and communication skills that are useful within the context of climate change and health for collaborating with communities and sectors responsible for health. The content of education on adapting the health system is broad, and ranges from knowledge on the relationship between heat or heat waves and health to topics like cost reduction and the financial impact of long-term adaptation behaviors.

Training and lifelong learning for healthcare professionals

- **Develop educational programs on climate change and health that clearly outline the necessary competencies of healthcare professionals and establish systems that enable healthcare professionals to learn about climate risks, adaptation, and mitigation within the frameworks of undergraduate education, professional training, and lifelong learning**
- **Collaborate with healthcare institutions, research organizations, professional associations, and other related stakeholders to develop training programs on climate change that address climate risks and the climate-related demands that those risks place on the health system, and integrate those programs into undergraduate education, professional training, and lifelong learning for healthcare professionals**
- **Build a system that enables healthcare professionals and health institutions to gain an understanding of the health impacts of climate change, identify areas that require attention, and take action**

3. Promoting research

While research on climate change and health is advancing in numerous countries around the world, in Japan, research in this area remains limited. To strongly promote research, it will be important to establish a research support mechanism spanning ministries and agencies, including Grant-in-Aid for Scientific Research, as well as to promote multi-stakeholder collaboration across industry, government, academia, and civil society.

There are a number of areas that will require institutional support and focused efforts for research progress. These include ascertaining the disease and health system burdens of climate change; conducting vulnerability assessments by region and health facility and identifying adaptation options; developing and verifying interventions for building a climate resilient health system; creating methods of tracking the carbon footprints of health system services; developing interventions to decarbonize health services and related supply chains; and identifying measures to transform the health system.

Research

- **To advance research on climate and health, deepen collaboration among industry, Government, academia, and civil society and establish a research infrastructure that allows for a transdisciplinary approach**
- **Enhance institutional support needed to advance research, such as by providing funding for scientific research, and promote low-emission climate-resilient research on topics such as climate risk, vulnerability assessment, disease burden, and carbon footprints**

Health and Global Policy Institute

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Regarding the independent nature of these recommendations

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HGPI Health and Global Policy Institute

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Health and Global Policy Institute (HGPI) is a Tokyo-based independent and non-profit health policy think tank, established in 2004. Since our establishment, HGPI has been working to help citizens shape health policy by generating policy options and bringing together stakeholders as a non-partisan think-tank. Our mission is to enhance the civic mind along with individuals' well-being and to foster sustainable, healthy communities by shaping ideas and values, reaching out to global needs, and catalyzing society for impact.

We commit to activities that bring together relevant players from various fields to deliver innovative and practical solutions and to help interested citizens understand available options and their benefits from broader, global, long-term perspectives.

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