

Planetary Health Project by the Health and Global Policy Institute (HGPI)

Perceptions, Knowledge, Actions and Perspectives of Healthcare Organizations in Japan in Relation to Climate Change and Health: A Cross-Sectional Study

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Ahead of the 30th Conference of the Parties (COP30) to the United Nations Framework Convention on Climate Change (UNFCCC), the Health and Global Policy Institute (HGPI) conducted an online self-administered survey to examine the perceptions, knowledge, actions, and perspectives on climate change and health among healthcare-related organizations in Japan.

The survey was carried out from October 3 to 28, 2025, targeting academic societies in medicine, dentistry, nursing, and pharmacy; professional healthcare associations; and industry organizations including those in pharmaceuticals, medical devices, and pharmaceutical distribution.

Key Survey Findings

1. Awareness

1.1. Awareness of Climate Change and Health Impacts (5-point scale)

Nearly all academic societies, professional associations, and industry organizations responded affirmatively (“strongly agree” or “somewhat agree”) to the statements that climate change is occurring and that it affects people’s health. This indicates a broad consensus on the issue.

1.2. Awareness of Greenhouse Gas (GHG) Emissions from the Healthcare Sector (5-point scale)

Regarding the extent to which GHG emissions from the healthcare sector contribute to climate change, fewer than half of academic societies answered “contribute significantly” or “contribute somewhat,” while two-thirds of industry organizations responded affirmatively. These results suggest that academic organizations tend to perceive the impact of healthcare-related GHG emissions on climate change as relatively low.

1.3. Perception of the Role of Healthcare Organizations (5-point scale)

Regarding the perception that healthcare sector organizations have a role in supporting patients and local communities in the context of climate change, 73.3% of industry organizations and 57.7% of academic organizations expressed a positive view. Among academic organizations, 25.0% responded “neutral”, and 16.9% expressed a negative view. Among professional associations, three organizations (75.0%) responded positively, while one organization (25.0%) responded “somewhat disagree”, indicating a difference in perception across organizational categories.

2. Knowledge

2.1. Knowledge of Domestic and International Trends on Climate Change and Health (4-point scale)

With regard to literature in international medical journals, discussions at COP, and the Ministry of the Environment’s climate change assessment reports, 56.7% of industry organizations responded that they were “very familiar” or “somewhat familiar.” Among academic societies, only about 40% gave the same response. Over half of academic societies responded “not very familiar” or “not familiar,” indicating a knowledge gap. Among professional associations, two were “not very familiar,” one was “somewhat familiar,” and one was “very familiar.”

2.2. Knowledge of Specific Adaptation and Mitigation Measures (4-point scale)

For adaptation measures, approximately 60% of academic societies and industry organizations answered “not very familiar” or “not familiar,” suggesting limited knowledge. Only around 32.2% of academic societies and 36.7% of industry organizations answered “somewhat familiar” or better, and very few answered “very familiar.” In contrast, three of the four professional associations (75.0%) reported being “somewhat familiar.” Knowledge of mitigation measures was even lower across all categories compared to adaptation measures.

3. Actions

3.1. Provision of Lifelong Education and Public Awareness (3-point scale)

Regarding the provision of lifelong learning opportunities for members, the most common response across all categories was “not provided and not under consideration” (academic societies 90.7%, industry organizations 69.0%, professional associations 75.0%). Only around 3% of academic societies and industry organizations reported offering such education, and none of the professional associations did. The proportion of organizations “preparing or considering” such initiatives was highest among industry organizations (27.6%) and lowest among academic societies (5.9%).

3.2. Countermeasures for Environmental Issues and Climate Change (3-point scale)

More than 90% of academic societies reported that they had not formulated or prepared countermeasures for environmental issues or climate change. In contrast, about 60% of industry organizations had not taken such steps. Among industry organizations, 13.8% reported having “formulated and published” measures for environmental issues, and 13.3% for climate change — showing more progress than academic societies.

3.3. Measures Against Biodiversity Loss (3-point scale)

In all categories — academic societies (96.6%), professional associations (75.0%), and industry organizations (73.3%) — the most frequent response was “not formulated/published and not under consideration,” highlighting the lack of progress in this area. However, approximately one-quarter of professional associations (25.0%) and industry organizations (23.3%) reported being in the “preparation/consideration” stage. One industry organization (3.4%) had already “formulated and published” measures.

3.4. **Implementation of Online Meetings (4-point scale)**

Among academic societies, 60.2% had conducted online meetings (OMs) not specifically aimed at reducing carbon footprint (CF), while only 13.6% had done so for CF reduction. Additionally, 20.3% had not held OMs, and 5.9% responded “don’t know.” In industry organizations, 37.9% had held OMs not for CF purposes, 17.2% had held them for CF purposes, and 37.9% had not. One professional association each had held OMs for CF and non-CF purposes, while one (25.0%) had not held any.

4. **Policy Perspectives**

4.1. **Expanding Investment in Health for Climate Change (3-point scale)**

Regarding the appropriateness of advocating for increased investment in the healthcare sector in response to climate change and health, 58.5% of academic societies answered “appropriate.” Meanwhile, 36.4% answered “don’t know,” indicating some hesitation. Only 5.1% considered it “inappropriate.” Among industry organizations, 60.0% considered it “appropriate,” and 40.0% “don’t know”; none responded negatively. All professional associations answered “appropriate.” Similar trends were observed regarding recommendations for strengthening climate action.

4.2. **Policy Advocacy for Strengthening Climate Measures (3-point scale)**

On the need for advocating government and stakeholder action to strengthen climate change countermeasures, a majority of each group agreed (academic societies 61.9%, professional associations 75.0%, industry organizations 70.0%). However, about one-third of academic societies (34.7%) and industry organizations (30.0%) responded “neither agree nor disagree,” indicating that while the importance of climate action is recognized, some organizations remain cautious about taking a formal stance or getting directly involved.

5. **Other Issues and Innovative Approaches**

5.1. **Other Issues and Efforts (Free-text Responses)**

The following four issues were identified as challenges: Lack of awareness-raising and educational efforts, the need to understand and organize knowledge and evidence, Inadequate organizational structures and resources, and Insufficient support in terms of practical and policy measures. Reported creative approaches included: providing research grants related to CO₂ emission reduction; sharing knowledge among members and at academic conferences; developing practical tools such as guidelines and disaster response manuals; and promoting deeper discussions within academic societies, including soliciting ideas from members. Many comments stated that, while the importance of climate change was recognized, specific initiatives were still lacking. This indicates a clear gap between awareness and concrete action.

5.2. **Support Requested from Government and Industry (Free-text Responses)**

Requests to the government included: economic support for CO₂ emission reduction and capital investments; public information dissemination and training of specialized personnel; sharing of best practices; and promotion of research on climate change and health. Requests to the industry sector included: expansion of awareness and education efforts incorporated into corporate identity; innovation support such as developing and providing affordable alternatives to disposable products and low-carbon materials; greening the medical system through improved medical materials, packaging, and resource circulation; generation of evidence and international collaboration; and promotion of preventive measures.

1. Background

Climate change is considered one of the most significant public health challenges of the 21st century¹. It poses serious threats to human health and well-being while placing immense strain on health systems worldwide². Japan is no exception. In recent years, the frequency of extreme weather events such as heatwaves, floods, and landslides has increased, and these are now recognized as major health threats³. Such impacts are known to disproportionately affect vulnerable populations, including older adults, children, pregnant women, and socioeconomically disadvantaged individuals⁴.

The Ministry of the Environment's *Climate Change Impact Assessment Report* published in 2020 provides a detailed evaluation of climate change's health impacts in Japan^{5–7}. Among the key concerns identified were heat-related illnesses and mortality, as well as vector-borne diseases transmitted by mosquitoes and ticks⁸. The report also highlights the health risks faced by vulnerable groups, particularly older people.

At the international level, leading medical journals have taken a strong stance on the urgency of climate action. On September 6, 2021, a joint editorial calling for emergency action to address the “catastrophic health harms” of climate change was simultaneously published by 233 health journals, including *The BMJ*, *The Lancet*, and *The New England Journal of Medicine*²⁸. While this movement reflected a growing global consensus, no Japanese journals were listed among the signatories²⁹.

Further, at the 28th Conference of the Parties (COP28) to the United Nations Framework Convention on Climate Change (UNFCCC) held in 2023, a “Health Day” was established for the first time, and the “COP28 Declaration on Climate and Health” was released³⁰. This declaration expressed deep concern over the adverse effects of climate change on health and emphasized the need to address the interconnections between climate change and human health and well-being within the context of the UNFCCC and the Paris Agreement. Over 140 countries, including Japan, endorsed the declaration. Shared goals include transforming health systems into climate-resilient, low-carbon, sustainable, and equitable structures, and integrating health considerations into climate policy processes—and vice versa.

Despite the growing body of scientific evidence on climate change and health, there are ongoing concerns that the healthcare sector's climate response remains insufficient⁹. In 2023, HGPI conducted a nationwide survey of practicing physicians in Japan to assess their perceptions, knowledge, and actions related to climate change and health. The results revealed that although many clinicians recognized the existence of climate change and its health effects, a lack of knowledge, time, resources, and educational opportunities hindered the implementation of effective climate action¹⁰. A similar trend was confirmed in a 2024 survey of nursing professionals¹¹.

Medical academic societies, professional associations, and healthcare professionals are well-positioned to accurately assess the health impacts of climate change and play a vital role in advancing climate policy¹². In Japan, some professional associations have expressed commitments to building environmentally conscious healthcare systems. For example, in 2009, the Japan Medical Association issued the “Declaration of the Japan Medical Association on the Environment”¹³, presenting four pillars of action to protect the planet and humanity. In 2023, the Japan Medical Association also released the “Proposals for the Future”¹⁴, which clearly identified climate change as a global challenge to be tackled collectively by healthcare professionals.

However, beyond these limited examples, little research has been conducted to examine how academic and professional societies in Japan recognize the health impacts of climate change, or to what extent they have established policies or organizational structures to respond—apart from one study conducted in the United States targeting medical societies¹⁵.

The objective of this study is to clarify the perceptions, knowledge, actions, and perspectives related to climate change and health among academic societies, professional associations, and industry organizations.

Figure 1: Survey on Climate Change and Health in Japan's Healthcare Sector (Objective and Target Groups)

Survey Summary

Objective	To clarify the perceptions, knowledge, actions, and perspectives related to climate change and health among academic societies (medical, dental, nursing, pharmaceutical), professional associations, and industry organizations in Japan's healthcare sector.
Target Population	<p>404 healthcare-related organizations</p> <p>Medical Academic Societies (302 organizations)</p> <p><i>Medical:</i> Societies affiliated with the Japan Medical Association (141 organizations)</p> <p><i>Dental:</i> Societies affiliated with the Japan Association for Dental Science (84 organizations)</p> <p><i>Nursing:</i> Societies affiliated with the Japan Association of Nursing Academies (49 organizations)</p> <p><i>Pharmaceutical:</i> Societies affiliated with the Federation of Japanese Pharmaceutical Societies (28 organizations)</p> <p>Professional Associations (8 organizations)</p> <p>Japan Medical Association, Japan Nursing Association, Japan Midwives Association, Japan Dental Association, and Hospital-related associations</p> <p>Industry Organizations (94 organizations)</p> <p><i>Pharmaceutical:</i> Japan Pharmaceutical Manufacturers Association and affiliated organizations</p> <p><i>Medical Devices:</i> Japan Federation of Medical Devices Associations and affiliated medical device organizations</p> <p><i>Pharmaceutical Wholesalers:</i> Federation of Japan Pharmaceutical Wholesalers Associations and its member organizations</p>

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2. Methods

This study was conducted as a cross-sectional survey using an online questionnaire. The questionnaire items were developed with reference to existing domestic and international surveys targeting healthcare professionals such as physicians, nurses, and dentists, as well as professional healthcare organizations^{15 16 17 18}.

The questionnaire consisted of six sections:

1. Basic Information: Organization category and respondent's position
2. Perceptions of Climate Change and Health
3. Knowledge of the Climate Change and Health Landscape
4. Actions for Climate Change Mitigation and Adaptation
5. Perspectives on Policy Recommendations Regarding Climate Change and Health
6. Other Challenges and Innovative Efforts; Support Requested from Government and Industry

Survey requests were sent to target organizations by mail, followed by reminders via phone and email. Responses were collected using Google Forms. For organizations that submitted responses in paper format, the data were entered manually. In cases where multiple responses were received from the same organization, the response from the organization's representative was used, and the others were excluded. If the organizational category reported in the survey differed from the predefined classification used by the authors, the responses were reclassified based on the authors' categorization.

Descriptive statistics were used for analysis, with counts and percentages calculated for categorical variables. The study was reviewed and approved by the Institute of Health Economics and Policy (IHEP), Japan.

Figure 2: Survey on Climate Change and Health in Japan's Healthcare Sector (Methods, Period, and Analysis)

Survey Summary

Method	<ul style="list-style-type: none"> • Online survey using a self-administered questionnaire (via Google Forms) • Consent was assumed upon submission of the questionnaire • To track response progress, inputting the organization's name was mandatory • Invitation letters were mailed to each organization, with follow-up reminders sent via email and phone • In cases of duplicate responses from the same organization, only the response from the representative was included • Items left unanswered were treated as missing values
Survey Period	October 3 – October 28, 2025
Statistical Analysis	Descriptive statistics
Ethical Review	Approved by the Ethics Committee of the Institute for Health Economics and Policy

3. Results

- A total of 169 organizations responded, and 152 organizations consented to participate and were considered valid responses (118 academic societies, 4 professional associations, and 30 industry organizations) (Figure 3). The response rate among academic societies was 37.6%. Among them, 67 were medical societies (47.5%), 21 were nursing societies (42.9%), 9 were pharmaceutical societies (32.1%), and 21 were dental societies (25.0%).
- Regarding the positions of the respondents, the most common role was president or chairperson, accounting for 89 organizations (58.6%), followed by board members or directors (35 organizations, 23.0%), others (19 organizations, 12.5%), and environmental committee representatives (9 organizations, 5.9%). Among academic societies, 72 responses (61.0%) came from presidents. In contrast, within industry organizations, 15 (50.0%) were from presidents, 5 (16.7%) from environmental committee representatives, and 7 (23.3%) from others. These findings indicate differences in the distribution of respondent positions by organizational category.

Figure 3: Survey Results

Survey Results

Responses were received from **169 organizations**, and **152 organizations** (118 academic organizations, 4 professional associations, and 30 industry groups) provided valid responses by agreeing to participate in the survey. The **overall response rate was 37.6%**. Among academic organizations, **47.5% were from medical associations** and **42.9% from nursing associations**.

As for the respondents' positions, **58.6% (89 individuals)** were **chairpersons**, followed by **board members (23.0%)**, **others (12.5%)**, and **environmental committee members (5.9%)**. Among academic organizations, a majority (61.0%) of responses came from chairpersons, while in industry groups, although **50.0% were chairpersons**, there was a higher proportion of responses from **environmental committee members (16.7%)** and **others (23.3%)**, indicating differences in the distribution of respondent positions depending on the organization type.

Table 1. Overview of Participating Organizations in the Survey

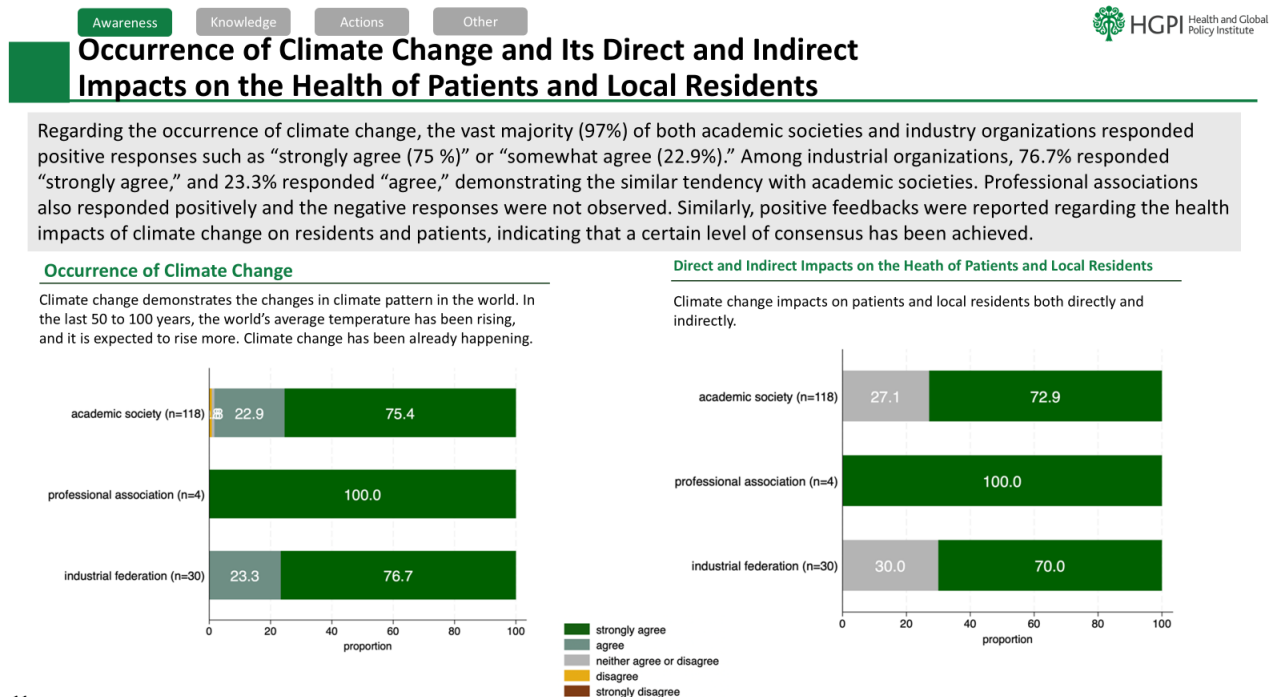
		Academic Societies				Professional Associations	Industry Organizations	Sum	
			Medicine	Dental Sciences	Nursing	Pharmacy			
Number of valid responses n (%)		118	67	21	21	9	4	30	152
Response rate		37.6%	47.5%	25.0%	42.9%	32.1%	50.0%	32.0%	
Without consent									17
Respondent's Position n (%)	Presidents or chairperson	72 (61.0)	39	12	14	7	2 (50.0)	15 (50.0)	89
	board members or directors	31 (26.3)	18	4	7	2	1 (25.0)	3 (10.0)	35
	environmental committee representatives	3 (2.5)	3	0	0	0	1 (25.0)	5 (16.7)	9
	Others	12 (10.2)	7	5	0	0	0 (0)	7 (23.3)	19

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3.1. Awareness

3.1.1. Occurrence of Climate Change and Its Impact on Local Communities (Figure 4)

Figure 4: Occurrence of Climate Change and Its Direct and Indirect Impacts on the Health of Patients and Local Residents



- Regarding the occurrence of climate change and its direct or indirect impacts on the health of patients and local residents, the vast majority of both academic societies and industry organizations responded “strongly agree” or “agree,” with affirmative responses exceeding 97%. This suggests a broad consensus on these points.
- Specifically, among academic societies, nearly all responded either “strongly agree” (75.4%) or “somewhat agree” (22.9%) regarding the occurrence of climate change. Only one organization (0.9%) expressed a negative view. Similarly, among industry organizations, the majority answered “strongly agree” (76.7%) or “agree” (23.3%), with no negative responses recorded. All professional associations answered “strongly agree.”
- As for the direct or indirect impact of climate change on the health of patients and local residents, over 90% of academic societies responded “strongly agree” (72.9%) or “somewhat agree” (27.1%), with no organizations expressing a dissenting opinion. Likewise, among industry organizations, 70.0% responded “strongly agree” and 30.0% “somewhat agree,” indicating near-universal agreement. All professional associations also responded “strongly agree.”

3.1.2. Greenhouse Gas Emissions Attributed to the Healthcare Sector (Figure 6)

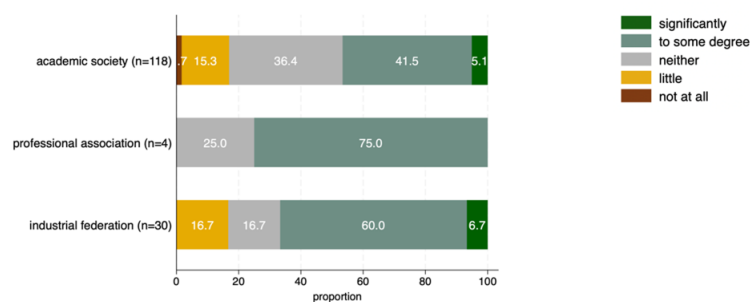
Figure 6: Greenhouse Gas (GHG) Emissions from the Healthcare Sector



Regarding the extent to which greenhouse gas (GHG) emissions from the healthcare sector contribute to climate change, less than half (46.6 %) of academic societies responded “contribute significantly” or “contribute somewhat,” while two-thirds (66.7 %) of industry organizations provided similar response. Conversely, about one-sixth (16.7 %) responded “contribute very little (15.3%).” Among professional associations, the most common response was “contribute somewhat” (3 organizations, 75.0%), while one organization answered “neither agree nor disagree.” Compared to industry organizations, academic societies may be underestimating the impact of GHG emissions from the healthcare sector on climate change.

Greenhouse Gas Emissions from the Health Sector

What is your perception of the extent to which greenhouse gas emissions from the health sector impacts climate change?



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- Regarding the extent to which greenhouse gas (GHG) emissions from the healthcare sector contribute to climate change, less than half (46.6%) of academic societies responded “contribute significantly” or “contribute somewhat,” while two-thirds (66.7%) of industry organizations provided similar responses.
- Conversely, about one-sixth (17%) of academic societies responded “contribute very little” (15.3%) or “hardly contribute at all” (1.7%). Among industry organizations, one-sixth (16.7%) responded “contribute very little.” Among professional associations, the most common response was “contribute somewhat” (3 organizations, 75.0%), while one organization answered “neither agree nor disagree.”
- Compared to industry organizations, academic societies may be underestimating the impact of GHG emissions from the healthcare sector on climate change.

3.1.3. The Role of Healthcare Organizations in the Context of Climate Change (Figure 7)

Figure 7: The Role of Healthcare Organizations in the Context of Climate Change

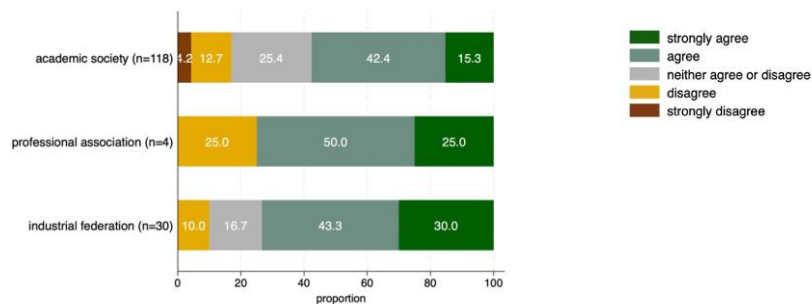
Awareness Knowledge Actions Other

The Role of Healthcare Organizations in the Context of Climate Change

Regarding the perception that healthcare organizations have a role in supporting patients and local communities in the context of climate change, 30.0% of industry organizations responded “strongly agree” and 43.3% “somewhat agree,” with a total of 70% expressing a positive view. Among academic societies, approximately 57.7% responded positively (“strongly agree” 15.3%, “somewhat agree” 42.4%). However, 25.4% responded “neither agree nor disagree,” and around 16.9% gave negative responses. Among professional associations, three organizations (75.0%) expressed agreement, while one (25.0%) responded “somewhat disagree.” These results indicate differences in perceptions across organizational categories.

The Role of Healthcare Organizations

Healthcare organizations have a role where patients and local residents understand the health impacts by the climate change and support taking the effective measures.



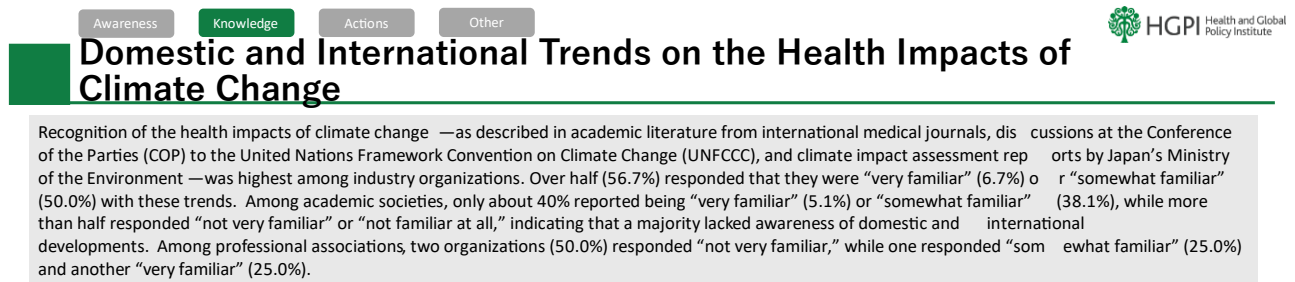
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- Regarding the perception that healthcare organizations have a role in supporting patients and local communities in the context of climate change, 30.0% of industry organizations responded “strongly agree” and 43.3% “somewhat agree,” with a total of 70% expressing a positive view.
- Among academic societies, approximately 57.7% responded positively (“strongly agree” 15.3%, “somewhat agree” 42.4%). However, 25.4% responded “neither agree nor disagree,” and around 16.9% gave negative responses.
- Among professional associations, three organizations (75.0%) expressed agreement, while one (25.0%) responded “somewhat disagree.” These results indicate differences in perceptions across organizational categories.

3.2. Knowledge

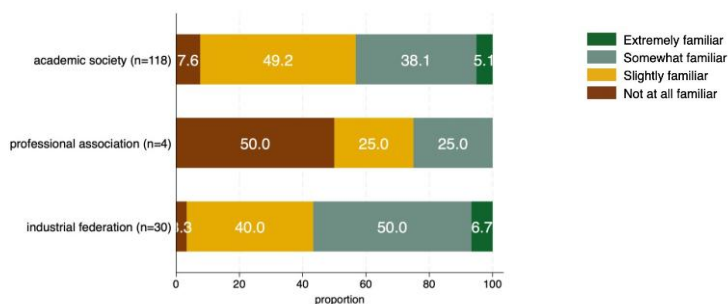
3.2.1. Domestic and International Trends on the Health Impacts of Climate Change (Figure 8)

Figure 8: Domestic and International Trends on the Health Impacts of Climate Change



Domestic and International Trends on the Health Impacts

How familiar are you with the impacts of climate change on health based on the discussions at the United Nations Climate Change Conferences (COP) and domestic developments such as climate change assessment reports?



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- Recognition of the health impacts of climate change—as described in academic literature from international medical journals, discussions at the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC), and climate impact assessment reports by Japan’s Ministry of the Environment—was highest among industry organizations. Over half (56.7%) responded that they were “very familiar” (6.7%) or “somewhat familiar” (50.0%) with these trends.
- Among academic societies, only about 40% reported being “very familiar” (5.1%) or “somewhat familiar” (38.1%), while more than half responded “not very familiar” or “not familiar at all,” indicating that a majority lacked awareness of domestic and international developments.
- Among professional associations, two organizations (50.0%) responded “not very familiar,” while one responded “somewhat familiar” (25.0%) and another “very familiar” (25.0%).

3.2.2. Knowledge of Adaptation and Mitigation Measures (Figure 9)

Figure 9: Knowledge of Adaptation and Mitigation Measures for Climate Change

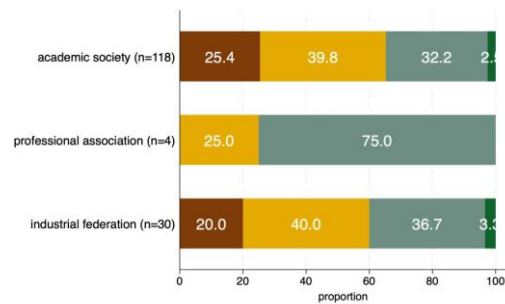
Awareness Knowledge Actions Other

Knowledge of Adaptation and Mitigation Measures

Regarding knowledge of specific adaptation measures for climate change, 65.2% of academic societies and 60.0% of industry organizations answered “not very familiar” or “not familiar at all,” indicating insufficient knowledge in these groups. With respect to mitigation measures, nearly all academic societies (98.3%) responded either “hardly familiar” (30.5%) or “not very familiar” (67.8%). On the other hand, 75% of professional organization answered “somewhat familiar.” Regarding mitigation measures, the results demonstrated that knowledge levels are even lower in all categories compared to adaptation measures.

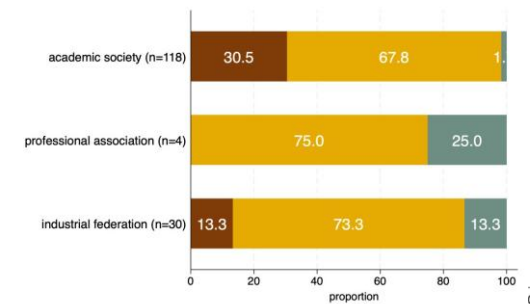
Knowledge on adaptation measures

How much do you know about the specific adaptation measures that should be implemented as part of climate change



Knowledge on mitigation measures

How much do you know about the specific mitigation measures that should be implemented as part of climate change measures?



Extremely familiar
Somewhat familiar
Slightly familiar
Not at all familiar

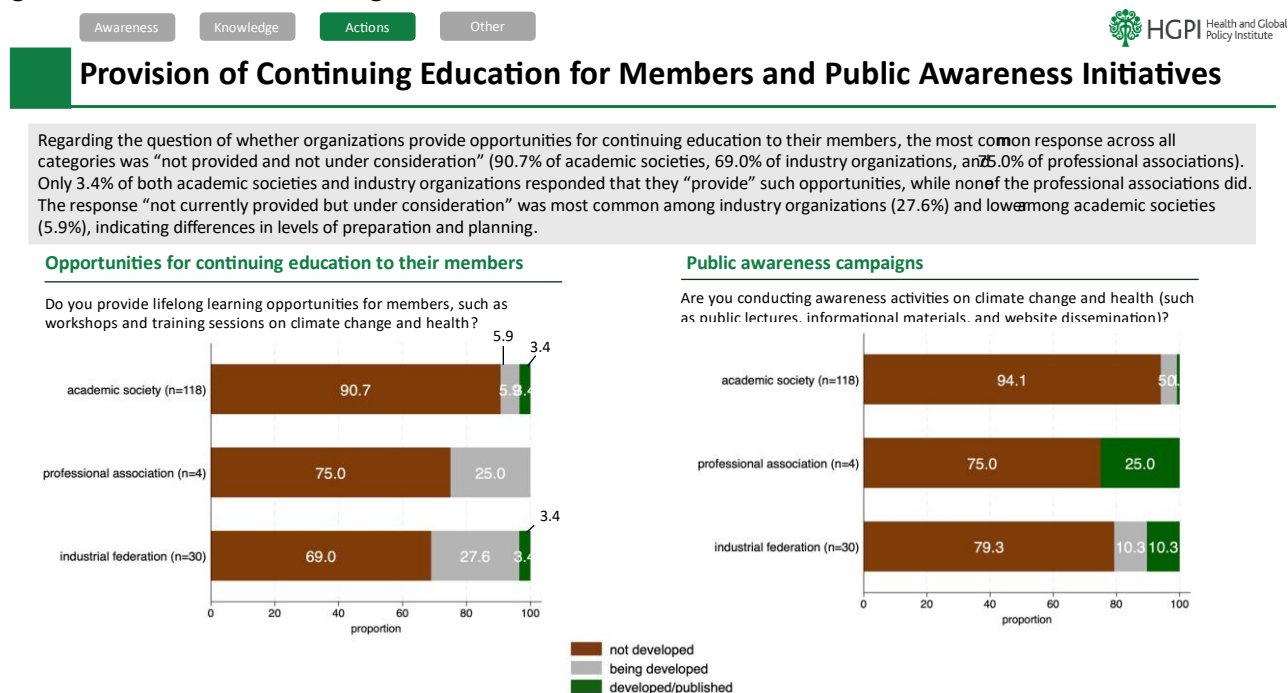
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- Regarding knowledge of specific adaptation measures for climate change, professional associations showed the highest level of understanding, with 75.0% responding “somewhat familiar.” In contrast, 65.2% of academic societies and 60.0% of industry organizations answered “not very familiar” or “not familiar at all,” indicating insufficient knowledge in these groups. The percentage of respondents who answered “very familiar” was low across all categories: 2.5% for academic societies, 3.3% for industry organizations, and 0% for professional associations.
- With respect to mitigation measures, nearly all academic societies (98.3%) responded either “hardly familiar” (30.5%) or “not very familiar” (67.8%). Similarly, 86.6% of industry organizations responded “hardly familiar” (13.3%) or “not very familiar” (73.3%), showing a widespread lack of sufficient knowledge.
- No organizations reported being “very familiar” with mitigation measures, and the proportion of those responding “not very familiar” or “not familiar at all” was higher for mitigation than for adaptation.

3.3. Actions

3-3-1. Provision of Continuing Education for Members and Public Awareness Initiatives (Figure 10)

Figure 10: Provision of Continuing Education for Members and Public Awareness Initiatives



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- Regarding the question of whether organizations provide opportunities for continuing education to their members, the most common response across all categories was “not provided and not under consideration” (90.7% of academic societies, 69.0% of industry organizations, and 75.0% of professional associations).
- Only 3.4% of both academic societies and industry organizations responded that they “provide” such opportunities, while none of the professional associations did. The response “not currently provided but under consideration” was most common among industry organizations (27.6%) and lower among academic societies (5.9%), indicating differences in levels of preparation and planning.
- Similarly, for public awareness initiatives, the majority in all categories responded “not provided and not under consideration” (94.1% of academic societies, 79.3% of industry organizations, and 75.0% of professional associations).
- On the other hand, 25.0% of professional associations reported that they “provide” such initiatives, a proportion notably higher than those in the other categories.

3-3-2. Response Measures for Environmental Issues and Climate Change (Figure 11)

Figure 11: Measures Addressing Environmental Issues and Climate Change

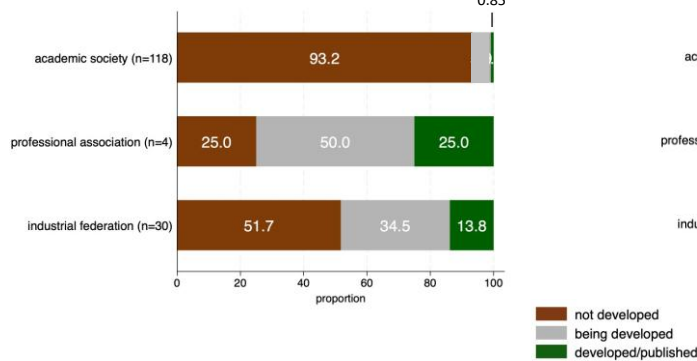
Awareness Knowledge **Actions** Other

Response Measures for Environmental Issues and Climate Change

Regarding measures addressing environmental issues, environmental pollution, and climate change, a large majority of academic societies responded “no measures developed, published, or under consideration”—93.2% for environmental issues and 95.8% for climate change—indicating extremely limited engagement. In contrast, among industry organizations, the percentage responding “no measures developed, published, or under consideration” was lower: 51.7% for environmental issues and 60.0% for climate change. The proportion of organizations that responded “measures have been developed and published” was 13.8% for environmental issues and 13.3% for climate change, suggesting more progress compared to academic societies. Among professional associations, 25.0% (1 organization) reported having “developed and published” measures, while 50.0% (2 organizations) reported being “in the process of preparation or consideration,” showing a relatively active level of engagement.

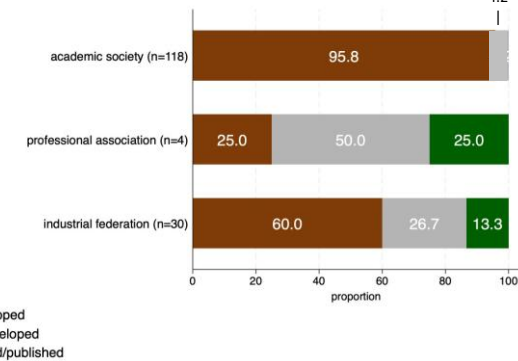
Measures for Addressing Environmental Issues

Have you formulated and published countermeasures (action plans),



Climate Change Mitigation Measures

Have you formulated and published measures to address climate change



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- Regarding measures addressing environmental issues, environmental pollution, and climate change, a large majority of academic societies responded “no measures developed, published, or under consideration”—93.2% for environmental issues and 95.8% for climate change—indicating extremely limited engagement.
- In contrast, among industry organizations, the percentage responding “no measures developed, published, or under consideration” was lower: 51.7% for environmental issues and 60.0% for climate change. The proportion of organizations that responded “measures have been developed and published” was 13.8% for environmental issues and 13.3% for climate change, suggesting more progress compared to academic societies.
- Among professional associations, 25.0% (1 organization) reported having “developed and published” measures, while 50.0% (2 organizations) reported being “in the process of preparation or consideration,” showing a relatively active level of engagement.

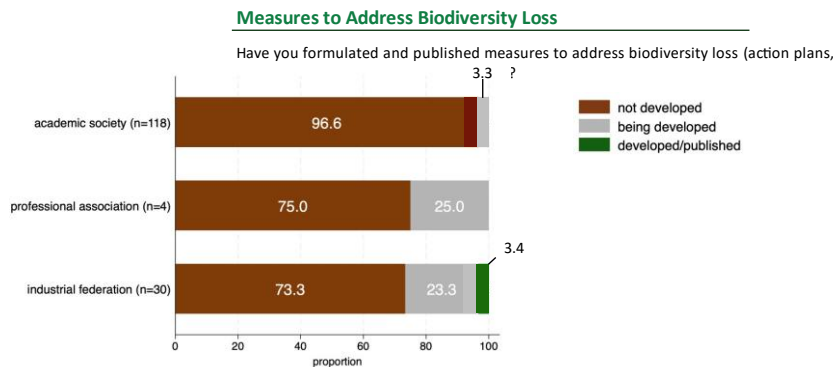
3-3-3. Measures to Address Biodiversity Loss (Figure 12)

Figure 12: Measures to Address Biodiversity Loss

Awareness Knowledge **Actions** Other

Measures to Address Biodiversity Loss

Across all categories—academic societies, professional associations, and industry organizations—the most common response regarding measures to address biodiversity loss was “no measures developed, published, or under consideration,” indicating that progress on this issue remains limited. On the other hand, for the response “not yet developed or published, but under preparation or consideration,” 25.0% (1 organization) of professional associations and 23.3% (7 organizations) of industry organizations reported being in the planning stage.



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- Across all categories—academic societies, professional associations, and industry organizations—the most common response regarding measures to address biodiversity loss was “no measures developed, published, or under consideration,” indicating that progress on this issue remains limited.
- On the other hand, for the response “not yet developed or published, but under preparation or consideration,” 25.0% (1 organization) of professional associations and 23.3% (7 organizations) of industry organizations reported being in the planning stage.
- Among industry organizations, only one organization (3.4%) reported having “developed and published” measures to address biodiversity loss.

3-3-4. Implementation of Online Meetings (Figure 13)

Figure 13: Implementation of Online Meetings

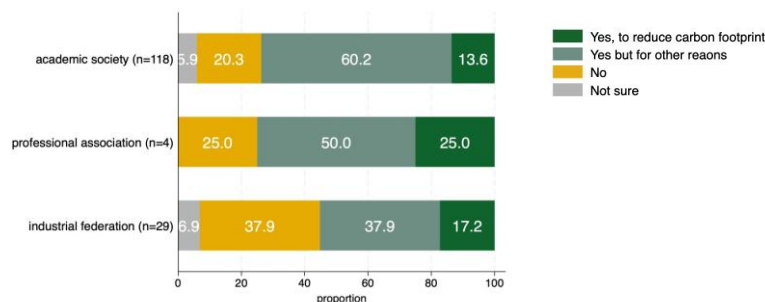
Awareness Knowledge **Actions** Other

Implementation of Online Meetings

Among academic societies, 60.2% reported conducting OMs for purposes other than reducing carbon footprint (CF), the highest proportion among the categories. In contrast, only 13.6% conducted OMs specifically for CF reduction. Additionally, 20.3% reported not conducting OMs at all and 5.9% responded "don't know." Among industry organizations, 37.9% conducted OMs for purposes other than CF reduction, while 17.2% did so for CF reduction. Similar to academic societies, 37.9% reported not conducting OMs, and 6.9% responded "don't know." Among professional associations, one organization each reported conducting OMs for CF and non-CF purposes, while 25.0% reported not conducting OMs.

Implementation of Online Meetings

Are you implementing initiatives to reduce carbon footprints (CO₂ emissions) caused by member travel and other factors by holding meetings online (or hybrid) starting in 2024?



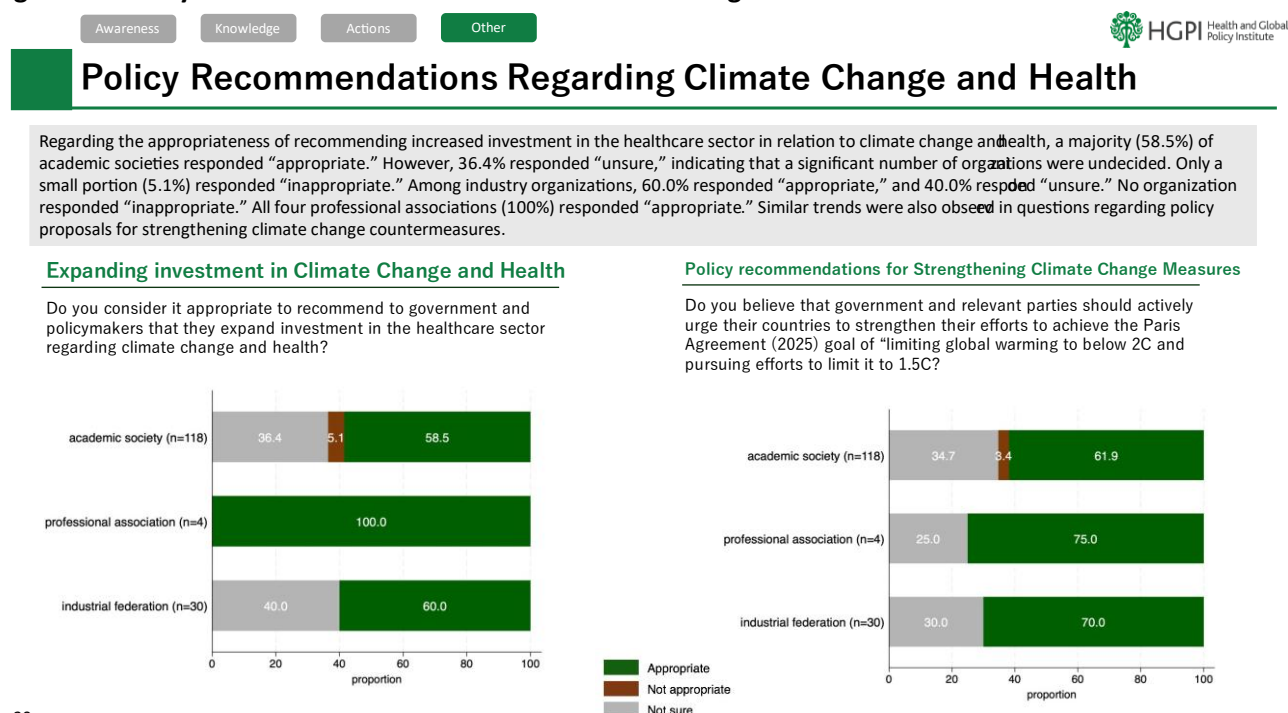
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- One action that organizations can take at the organizational level is the use of online meetings (OMs) as a means to reduce carbon dioxide (CO₂) emissions associated with travel. The targeted academic societies, professional associations, and industry organizations consider conferences and meetings key activities for sharing knowledge and building networks. These events often involve elements directly linked to environmental burdens, such as participant travel, catering, and the production and distribution of printed materials.
- Among academic societies, 60.2% reported conducting OMs for purposes other than reducing carbon footprint (CF), the highest proportion among the categories. In contrast, only 13.6% conducted OMs specifically for CF reduction. Additionally, 20.3% reported not conducting OMs at all, and 5.9% responded "don't know."
- Among industry organizations, 37.9% conducted OMs for purposes other than CF reduction, while 17.2% did so for CF reduction. Similar to academic societies, 37.9% reported not conducting OMs, and 6.9% responded "don't know."
- Among professional associations, one organization each reported conducting OMs for CF and non-CF purposes, while 25.0% reported not conducting OMs.

3.4. Policy Recommendations Regarding Climate Change and Health

3.4.1. Policy Recommendations for Expanding Investment in the Healthcare Sector and Strengthening Climate Action (Figure 14)

Figure 14: Policy Recommendations Related to Climate Change and Health



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- Regarding the appropriateness of recommending increased investment in the healthcare sector in relation to climate change and health, a majority (58.5%) of academic societies responded “appropriate.” However, 36.4% responded “unsure,” indicating that a significant number of organizations were undecided. Only a small portion (5.1%) responded “inappropriate.”
- Among industry organizations, 60.0% responded “appropriate,” and 40.0% responded “unsure.” No organization responded “inappropriate.”
- All four professional associations (100%) responded “appropriate.”
- A similar trend was observed for the question on whether organizations believe it is appropriate to actively advocate for stronger national climate action to achieve the goals of the Paris Agreement (2015), which aims to limit global warming to below 2°C and pursue efforts to limit it to 1.5°C. Of the academic societies, 73 organizations (61.9%) responded “appropriate,” along with 3 professional associations (75%) and 21 industry organizations (70.0%).

3.5. Other (Free-Text Responses)

3.5.1. Additional Challenges and Innovative Approaches (Figure 15)

Figure 15: Recognized Challenges and Implemented Strategies (Free-Text Responses)



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- The identified challenges were broadly categorized into: 1. Lack of awareness-raising and public engagement, 2. Need to better understand and organize knowledge and evidence, 3. Inadequate organizational structures and resources, 4. Insufficient support for practical and policy-level actions.
- The strategies currently being implemented included: providing research grants for CO₂ emission reduction, sharing knowledge among members and at academic conferences, developing practical tools such as guidelines and emergency manuals, and promoting internal discussions within academic societies, including soliciting ideas from members.
- Many respondents expressed that although these issues are recognized as important, concrete actions are still limited. This highlighted a clear gap between awareness and actual implementation.

3.5.2. Desired Measures from Government and Industry (Figure 16)

Figure 16: Desired Measures from Government and Industry



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- As “desired measures from the government,” respondents cited the need for economic support such as incentives for CO₂ emission reduction and funding for facility investments; the provision of information to citizens; the development of specialized human resources; the sharing of best practices; and the promotion of research grants related to climate change and health.
- As for “desired measures from industry,” suggestions included expanding awareness and education initiatives integrated into corporate identity; supporting innovation such as developing and providing affordable alternatives to disposable products and low-carbon materials; greening the healthcare system through improvements in medical materials, packaging, and resource circulation; generating evidence and promoting international collaboration; and advancing preventive measures.

4. Discussion

This survey revealed the following five key findings.

4.1 Variability in Awareness Among Medical Organizations

Differences in perceived relevance (sense of ownership or psychological proximity) regarding the issue of climate change and health were observed across organization categories. While a high level of awareness was demonstrated across academic societies, professional associations, and industry organizations regarding the occurrence of climate change and its health impacts on patients and local communities, awareness was more varied when it came to the healthcare sector's contribution to climate change through greenhouse gas (GHG) emissions, as well as the role of providing appropriate support to patients and communities in response to these health impacts.

Notably, academic societies showed relatively lower levels of awareness compared to industry organizations and professional associations regarding both the healthcare sector's contribution to climate change via GHG emissions and their own roles in protecting patients and communities. Similar trends have been reported in previous studies targeting healthcare professionals. This may be influenced by the inherent characteristics of academic societies. Specifically, awareness of the occurrence of climate change and its health impacts may be more readily formed through clinical practice such as medical treatment, nursing, or pharmacy services. However, the perception of healthcare's systemic contribution to climate change and the broader societal responsibility of medical academic societies may be weaker or seen as outside the scope of their specific research domains or expertise.

In fact, among the organizations that declined to participate in this survey, multiple responses stated that the subject matter was outside their area of focus.

4.2 Lack of Knowledge and Information

Another major barrier to advancing action on climate change and health is the lack of knowledge and information. Approximately 60% of both academic societies and industry organizations reported that they had little or no understanding of specific climate adaptation and mitigation measures, indicating that the foundational knowledge necessary for climate action is not yet adequately established.

This knowledge gap may be influenced not only by the aforementioned disparities in awareness but also by the lack of systematic information dissemination and learning opportunities. In contrast, professional associations showed relatively higher levels of understanding, which may be due in part to initiatives by international professional bodies—such as the World Medical Association's "Climate Emergency Declaration"²⁰ and the International Council of Nurses' "Position Statement on Climate Change."²¹

4.3 Limited Opportunities for Continuing Education and Public Awareness

A lack of opportunities provided by medical organizations for healthcare professionals and stakeholders to acquire knowledge has also been identified. The survey revealed that most organizations have not implemented continuing education programs for their members or public awareness initiatives aimed at enhancing knowledge and skills (i.e., capacity building).

A previous study that reviewed the websites of 115 medical academic societies in the United States found that only 8% offered educational outreach to the public¹⁵. This suggests that low organizational awareness of the relationship between climate change and health may hinder the creation of opportunities for knowledge acquisition and capacity development among members.

4.4 Lack of Measures on Environmental Issues and Climate Change, and Organizational-Level Initiatives

Most organizations had not formulated measures for environmental issues or climate change, and only a small number were currently in the "under consideration/preparation" phase. On the other hand, some academic societies had voluntarily advanced initiatives such as guidelines for heat - stroke prevention/management or disease-management manuals for times of disaster. However, these efforts depend on each individual organization's initiative, and it was shown that systematic or sector-wide

frameworks are not yet well established.

Moreover, the introduction of online meetings—a measure contributing to reduced environmental burden—was confirmed in many organizations. Particularly among academic societies the implementation rate was high and appeared to be ahead of that in industry organizations. Although the principal purpose of going online was not necessarily to reduce the carbon footprint, in terms of reducing CO₂ emissions associated with travel, such efforts hold a certain significance.

4.5 Positive Response to Policy Recommendations

Regarding policy recommendations to expand investment in climate change and health, and to strengthen measures toward the goals of the Paris Agreement, 60% of organizations responded “appropriate.” The proportion tended to be higher among industry organizations compared to academic societies, suggesting that many organizations view advocacy to governments and policy-makers positively.

Internationally, networks of healthcare professionals are promoting policy recommendations and collaborative action. For example, in the U.S., the Medical Society Consortium on Climate and Health—a network of healthcare professional societies—was established to promote climate-health policy advocacy and action. In the U.K., the UK Health Alliance on Climate Change carries out similar activities.

Meanwhile, in Japan, the Japan Medical Association (which academic medical societies belong to) published “Proposals for the Future” in March 2023, clearly positioning climate change as a global health challenge. In that report, multi-faceted responses were recommended including awareness raising, promoting mitigation and adaptation measures, and strengthening healthcare systems. Going forward, in order to reflect these recommendations in policy and practice, the formation of networks that span healthcare professions and organizations is desirable.

Other challenges identified by healthcare-sector organizations included raising awareness and education, organizing and consolidating scientific evidence, insufficient institutional structures, and lack of policy support. Many of these issues are not easily resolved at the level of a single organization. As policies sought from government, respondents cited economic support (incentive design), support for information provision and education, environmental education in schools and higher education, sharing of best practices, and promotion of research on climate change and health. On the industry side, suggestions included development of environmentally conscious medical materials and equipment, public awareness campaigns, and sharing of scientific evidence. These should be regarded as key enabling factors in the health-care sector’s advancement of climate-change measures.

In 2020, the Japanese government declared its goal of achieving carbon neutrality by 2050. Certainly, efforts toward decarbonisation (reduction of CO₂ emissions) include the healthcare sector. Legal frameworks such as the Act on Rationalising Energy Use (Energy Conservation Law), the Act on Promotion of Global Warming Countermeasures (amended 2021), and the Act on Promoting Transition to a Decarbonised Growth-Type Economic Structure (GX Promotion Law) have been advanced. Furthermore, through the Green Growth Strategy (Ministry of Economy, Trade and Industry) and the GX Implementation Council (Cabinet Secretariat), related measures have progressed — and these frameworks include the healthcare industry.

However, efforts toward carbon neutrality in the healthcare sector remain limited. Under the Energy Conservation Act and the Global Warming Countermeasures Act, medical institutions are positioned as business operators subject to reporting and reduction obligations for energy use. Yet, of approximately 8,200 hospitals nationwide, only about 800 have submitted reports. This is because many medical institutions in Japan use less than 1,500 kL of energy annually and thus fall outside the reporting-obligation threshold. Therefore, even though they are technically subject, actual efforts and reporting remain limited. In addition, the Ministry of Health, Labour and Welfare convenes a Low-Carbon Society Implementation Plan Follow-Up Committee, in which professional associations and industry organisations participate; however, it meets only annually and there is no binding obligation to meet specific targets.

In the area of clinical practice as well, few guidelines or action plans for “green practices” (environmentally conscious care) developed by academic societies or other entities can be found. As a result, compared with sectors where decarbonisation is being prioritised—such as energy and mobility—the healthcare sector in Japan lacks sufficient institutional and economic incentives to promote climate - change measures. Given that greenhouse gas (GHG) emissions attributable to the healthcare sector account for around 5–6% of all industry emissions in Japan, it is considered that the healthcare sector should be a key focus in future decarbonisation policy.

A useful advanced example of climate - change measures in the healthcare sector is found in the United Kingdom. The UK’s National Health Service (NHS) has launched the “Greener NHS” strategy, targeting net - zero CO₂ emissions by 2040 and promoting both adaptation and decarbonisation efforts^{22,23}. The strategy sets out multiple focus areas—pharmaceuticals (inhalers, anaesthetic gases), transport and mobility (vehicles), facilities and equipment, food, clinical care, research and supply chains—and regularly reports on carbon - emission reduction targets and progress.

Thus, for the healthcare sector to advance climate - change measures efficiently, cross - sectoral and comprehensive initiatives are indispensable. In Japan too, it is necessary to build a comparable systematic framework. As the findings of this survey indicate, current efforts still depend on individual organisations or medical institutions, and sufficient incentives are lacking. Therefore, policy instruments such as the provision of systematic knowledge and education programmes on adaptation and mitigation, incorporation of environmental considerations into reimbursement items in the fee - for - service system, and establishment of subsidies or grants for healthcare institutions and organisations engaged in reducing environmental burdens could be effective. To realise these measures, it is important not only to strengthen inter - ministerial collaboration within government but also to ensure that healthcare - sector organisations actively participate in the policy - making process.

In other countries, national strategies on climate change led by ministries of health have been formulated and implemented^{24,25}. On the other hand, in Japan, there is still no national-level strategy that organizes adaptation and mitigation measures in the healthcare sector in a systematic way. Against this backdrop, Health and Global Policy Institute (HGPI) published in June 2024 its “National Health and Climate Strategy for the Healthcare Sector.”²⁶ This policy recommendation aims to build a resilient, low-carbon, and sustainable health system in the face of increasingly manifest climate change. It calls for healthcare system reform, generation and sharing of further evidence, strengthening education and capacity development for health professionals, and the redesign of incentives including reimbursement and subsidies. The findings of the present survey are aligned with the direction of this recommendation, and suggest the need not only to reconsider the financial sustainability of the healthcare system but also its sustainability from the perspectives of environment and climate change, and to advance policy making accordingly.

This survey is the first study to clarify perceptions, knowledge, actions, and perspectives related to climate change and health among academic societies, professional associations, and industry organizations in the healthcare sector in Japan. To the best of the authors’ knowledge, there is no precedent either in Japan or internationally for a study that systematically examined the state of organizational-level efforts across a wide range of entities: multiple medical academic societies (in the fields of medicine, dentistry, nursing, and pharmacy), professional associations comprising physicians, dentists, nurses, and pharmacists, and various sectors including pharmaceuticals, medical devices, and medical wholesalers. Therefore, this survey provides extremely important insights for understanding the current situation of the entire healthcare sector in Japan, including industry organizations.

4.6 Limitations of This Study

Limitations of This Study

1. Possibility of selfselection bias

First, there is the possibility of self-selection bias. Because participation was voluntary, organizations that elected to take part may have had a higher interest in the topic of climate change and health or may have already been undertaking some form of action, compared with those that did not participate. Therefore, this survey may overestimate the awareness, knowledge, actions and perspectives of the healthcare sector as a whole, and the results cannot be generalized across the entire sector.

2. Possibility of information bias due to proxy measurement

The unit of analysis in this survey was the organization, yet we collected responses from designated individuals (key informants) who reported on behalf of their organization. Proxy reporting can introduce bias²⁷. Moreover, the individual representing the organization may mix their personal viewpoint with the organization's collective stance, which may also act as a latent bias.

3. Social desirability bias

Respondents may tend to provide answers that are viewed favourably by others. In this survey, the invitation was sent to the presidents of healthcare-sector organizations, and 60% of valid responses came from presidents or board members. Given that such senior respondents may feel an additional pressure to respond in a socially acceptable manner, the possibility that social desirability bias is present cannot be ruled out.

Despite these limitations, no comparable survey was found either domestically or internationally, and this study nevertheless offers valuable insights into the perceptions, knowledge, actions, and perspectives on climate change and health among healthcare organizations that constitute the health system of a high-income country.

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Despite these limitations, no comparable survey was found either domestically or internationally, and this study nevertheless offers valuable insights into the perceptions, knowledge, actions, and perspectives on climate change and health among healthcare organizations that constitute the health system of a high-income country.

5. Summary

This survey clarified the perceptions, knowledge, actions, and perspectives on climate change and health among organisations in Japan's healthcare sector. The findings revealed variability in awareness, a lack of knowledge and information, limited opportunities for lifelong education and public awareness, and a generally positive view toward policy recommendations on climate change.

Looking ahead, in order to respond to the impacts of climate change—on people's health, on healthcare systems, and on society—which are expected to become increasingly apparent, it is important for healthcare-sector

organisations to collaborate with government, policy-makers and health professionals, and on the basis of these findings to advance the strengthening of healthcare system resilience and decarbonisation.

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Conflict of Interest

The contributors declare no conflict of interest.

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