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March 2026 | Report

Vulnerability and Adaptation

Current work across the GGHH Pacific Network

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Recognition and Commitment
We acknowledge the Traditional Custodians of the lands and waters across the region, including Aboriginal and Torres Strait Islander Peoples in Australia, Māori in Aotearoa, and the Indigenous peoples of the Pacific. We recognise their enduring sovereignty, deep cultural knowledge, and continuing connection to place. We commit to listening, learning, and working in ways that honour and reflect Indigenous ways of being and knowing in our shared pursuit of health equity.

Vulnerability and Adaptation

Current work across the GGHH Pacific Network

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Executive Summary

Climate change is increasingly disrupting healthcare systems across the Pacific, with more frequent and severe events exposing vulnerabilities in service delivery, health workforce and infrastructure. These pressures affect both immediate operations and long-term workforce capacity, service continuity and system resilience.

Health services can no longer rely on reactive crisis response. They must instead adopt a holistic approach that identifies their exposure, sensitivity and vulnerability to climate-related hazards, and how hazards may affect key operational domains, including their workforce, water, sanitation, hygiene, waste, energy, infrastructure, technologies and processes. A coordinated, evidence-based approach will strengthen adaptive capacity and resilience of the health system, ensuring it remains reliable, equitable and sustainable.

This report examines how members of the Global Green and Healthy Hospitals Pacific network are assessing their vulnerability to, and adapting to, escalating climate hazards. The purpose of this document is to consolidate emerging practice, strengthen capability across the network and provide a unified reference point for coordinated climate-risk approach.

The findings show that national climate risk assessments provide robust, integrated analysis, but their translation into healthcare-specific assessments at a local level is incomplete and inconsistent. New Zealand demonstrates cohesive adaptation due to strong central coordination, while Australian states and territories vary in maturity: NSW and Queensland have well-structured programs linked to governance systems; Victoria integrates adaptation through sustainability reporting; and Tasmania is still developing foundational strategies. Regionally, adaptation actions largely address well-recognised risks such as heat stress, bushfire smoke, flooding, infectious disease shifts and service disruption. However, these actions tend to be operational, short-term and small in scale. Infrastructure adaptation has yet to progress beyond early groundwork. Workforce training and climate literacy initiatives show the strongest and most scalable progress, with programs in NSW, Victoria and Queensland demonstrating high uptake.

The report recommends strengthening mandates, standardising tools and improving coordination between national and subnational systems to move from planning to implementation. Health services will need to embed adaptation within governance structures, invest in long-term infrastructure resilience, improve data systems and support sustained upskilling of the workforce.

Implementing these actions will enhance climate resilience across the region by reducing service disruptions, improving the ability to manage compounding hazards, and ensuring future infrastructure and systems are designed for long-term climate pressures. Clearer governance, better data integration and targeted investment will help organisations move beyond isolated projects toward coordinated, system-wide transformation.

Introduction

Climate change is already affecting the health and wellbeing of our communities and the conditions under which health systems operate.[1,2] Observed and projected changes in the frequency and intensity of climate-related hazards, together with compounding social, economic, and ecological pressures, are increasing risks to populations and to the continuity, safety, and equity of healthcare delivery.[1] These risks are not distributed evenly; differential exposure, sensitivity, and adaptive capacity shape who is most affected and how quickly communities and services can recover.[1] In this context, the performance of health systems is increasingly a function of their ability to anticipate, absorb, and adapt to climate-related shocks and longer-term stressors, while maintaining core functions.[2-6]

Evidence indicates that adaptation actions within health systems are underway and initiatives to integrate climate considerations into policy, planning, infrastructure investment, surveillance, and emergency preparedness are emerging.[2-4] However, current efforts remain insufficient relative to the scale and pace of risk.[2] The available literature points to persistent constraints, including[1-4]:

- Uneven implementation capacity and capability (like inadequate monitoring and evaluation)
- Limited resources and financing
- Gaps in decision-relevant information
- Governance arrangements that do not consistently translate risk recognition into operational change

For the Pacific region, defined in this report as Australia and Aotearoa New Zealand, these dynamics are increasingly significant. Health services are currently experiencing disruptions from climate-related hazards, affecting interconnected systems essential to delivering healthcare, including the availability of healthcare personnel, utilities, and infrastructure.[3,4] As climate conditions shift beyond historical norms, relying on past experiences to predict future risks is no longer effective.[5] This emphasises the need for systematic approaches to identify risks, assess vulnerabilities, and plan for adaptation, to ensure that health services are resilient, remain operational, and minimise avoidable harm.[2-8] Both countries have demonstrated their commitment to addressing these challenges by engaging with the World Health Organization (WHO) Alliance for Transformative Action on Climate and Health (ATACH).[5-8]

The WHO frameworks for creating climate-resilient, low-carbon health systems provide a structured guide for this work.[5-8] These frameworks connect climate risks to essential health system functions at the facility level. They highlight that adaptation should be viewed as a continuous process, requiring strong governance, consistent funding, and ongoing learning, rather than discrete, event-driven interventions. [5-8] This approach is crucial for building resilience against the evolving challenges posed by climate change.

Supporting the implementation of climate-resilient and low-carbon health systems requires a clear understanding of how these principles are translated into operational practice. Global

Green and Healthy Hospitals (GGHH) is an international program by Health Care Without Harm to support hospitals and healthcare services implement sustainability, resilience and decarbonisation measures. As of November 2025, 2,843 hospitals and health services were part of GGHH in the Pacific, managed regionally by the Climate and Health Alliance. The GGHH Pacific network was surveyed and interviewed for this report to provide a practice-informed perspective on how hospitals and health services are implementing these principles across the region.

Drawing on a three-stage mixed-methods design and applying WHO-aligned assessment tools across key operational domains, this report aims to:

1. **Consolidate current knowledge and practice** of climate hazard identification, vulnerability assessments, and adaptation across the GGHH Pacific network.

2. **Highlight areas of vulnerability** where adaptation planning has lagged, been inconsistently applied, or failed to deliver measurable resilience outcomes.

3. **Recommend actions to support health system adaptation** by establishing a shared reference point for risk recognition, system mapping, and benchmarking adaptation progress.

Establishing this shared baseline is essential for building coherent, coordinated adaptation efforts and for ensuring that the region's health services can move from reactive responses toward proactive, sustained climate resilience.

Section 1
Method

The report used a three-stage mixed-methods design. First, GGHH Pacific members were surveyed to gather information on their current work. Second, a structured document review of existing documents was performed, including policies, reports, guidelines, strategic plans and frameworks in Australia and Aotearoa New Zealand relevant to healthcare. Third, semi-structured interviews were conducted with members to capture insights and perspectives, and to refine interpretations of the survey and document review findings.

Data collection

The data was collected between July and October 2025.

1. **Survey (July-September 2025) -** The 16-item survey was based on prior studies and stakeholder input, then piloted and refined with feedback from three GGHH Pacific members. Launched in July, the survey period was extended from 6 to 12 weeks due to low initial response rates, and targeted reminders were sent to members at the midway point.
2. **Document search and review (July-October 2025) -** Relevant documents were identified through targeted web searches and GGHH Pacific member materials, using keywords such as risk, vulnerability, adaptation, resilience and climate change. Since most documents lacked abstracts, screening relied on keyword searches of the full text, focusing on the WHO operational domains. Documents found relevant were reviewed in full and included if they addressed climate hazard identification, vulnerability, or adaptation within healthcare operations.
3. **Interviews (October 2025) -** Semi-structured interviews with GGHH Pacific members focused on participants' experiences with climate vulnerability assessment and adaptation within their organisations, including perceived barriers, enablers, and priorities for strengthening climate resilience.

Data analysis

Data from the document review, survey, and interviews were analysed descriptively to examine patterns, trends, and perspectives on climate hazard identification, vulnerability assessments, and adaptation actions across GGHH Pacific member health services.

Survey

Closed-ended questions were summarised to assess climate hazard identification, vulnerability assessment, and adaptation across key operational domains. Open-ended responses were thematically coded to capture how this work is implemented, with themes refined to accurately reflect respondents' perspectives.

Documents

The document analysis involved a structured review using the below Assessment Checklists (Figures 1 and 2), adapted from the *WHO Checklists to Assess Vulnerabilities in Health Care Facilities in the Context of Climate Change*. Documents were coded and categorised using either (1) climate hazard identification and vulnerability assessment, or (2) adaptation across key operational domains

Using this information, a study-based matrix was developed, recording for each document the title, jurisdiction (national or subnational), and year of publication. For each document, we applied binary ("yes"/"no") coding to indicate whether climate hazards of concern (e.g., hydrometeorological, environmental change, biological, non-communicable diseases and injuries, technological, and societal) were identified for the location of the healthcare organisations, and whether vulnerabilities were identified in key operational domains: (1) health workforce, (2) water, sanitation, hygiene (WASH) and waste, (3) energy, and (4) infrastructure, technologies and processes (ITPs). In addition, the matrix included a series of binary ("yes"/"no") fields (items 1.1–4.3) to capture whether current adaptation policies, plans, or practices were in place for specific adaptation objectives within each of these four domains. We also recorded free-text comments to summarise key details and contextualise notes. This structure enabled systematic comparison of climate hazard identification, vulnerability assessment, and adaptation across documents and jurisdictions.

Figure 1: Assessment Checklist for Climate Hazard Identification and Vulnerability Assessment

Checklist adapted from WHO's 'Checklists to assess vulnerabilities in health care facilities in the context of climate change' used to review and develop a study-based matrix supporting the document analysis.

Climate Hazards* of Concern Identified	**Yes/No**
e.g., hydrometeorological, environmental change, biological (climate-sensitive diseases), non-communicable diseases and injuries, technological (mediated by climate hazards), societal (mediated by climate hazards)	☐
Vulnerabilities* Identified in Key Operational Domains	**Yes/No**
Health Workforce	☐
WASH and Waste	☐
Energy	☐
ITPs	☐
*Either current or possible with changed conditions	

Figure 2: Assessment Checklist for Adaptation Across Key Operational Domains
Checklist adapted from WHO's 'Checklists to assess vulnerabilities in health care facilities in the context of climate change' used to review and develop a study-based matrix supporting the document analysis.

Key Operational Domains	Adaptation Objectives	Yes/No
Health Workforce	**1.1. Human resources:** Planning for healthy and safe working conditions and a sufficient number of employees who are aware and have the capacity to ensure sustainable actions.	☐
	1.2. Capacity development: Provision of training, information and knowledge for employees to respond to climate risks and improve the sustainability of healthcare.	☐
	1.3. Communication and awareness raising: Efforts to increase awareness of climate resilience and sustainability among staff, patients, carers, communities and with other sectors.	☐
WASH and Waste	**2.1. Monitoring and assessment:** Management of water, sanitation, hygiene and waste, considering climate-resilience and sustainability.	☐
	2.2. Risk management: Strengthened capacity to manage operational risks to staff, patients and served communities, by including assessments of climate-resilience and sustainability in responding to hazards, and identifying and reducing exposures and vulnerabilities.	☐
	2.3. Health and safety regulation: Governance structures are implemented for water, sanitation, hygiene and waste service use and access, taking into consideration climate variability and change, and sustainability.	☐
Energy	**3.1. Monitoring and assessment:** Management of energy services to consider climate resilience and sustainability.	☐
	3.2. Risk management: Strengthened capacity to manage operational risks to staff, patients and served communities, by including assessments of climate-resilience and sustainability in responding to hazards, and identifying and reducing exposures and vulnerabilities.	☐
	3.3. Health and safety regulation: Governance structures are implemented for energy service use and access, taking into consideration climate variability and change, and sustainability.	☐
ITPs	**4.1. Adaptation of current systems and infrastructures:** Governance structures are implemented in the construction and retrofitting of facilities to ensure climate-resilience and sustainability.	☐
	4.2. Promotion of new systems and technologies: Innovation that can support climate-resilience, sustainability and enhanced health service delivery.	☐
	4.3. Sustainability of operations: Adopting and procuring low environmental impact technologies, products, processes and services to enhance climate resilience and sustainability.	☐

Interviews

Interview recordings were transcribed and analysed thematically using a coding framework based on study aims and key operational domains.

The analysis proceeded in several steps:

1. Initial coding – line-by-line coding of transcript segments.
2. Theme development – grouping related codes to identify recurring patterns across participants and jurisdictions.
3. Refinement and triangulation – themes were refined by comparing interview findings with the survey.

Survey and interview findings were then compared and analysed using the same two themes applied across the study: (1) climate hazard identification and vulnerability assessment and (2) adaptation across key operational domains. Using a shared framework enabled direct comparison across data sources and an overview of current knowledge and practice.

Section 2
Results and discussion

Desktop Review

A total of 81 documents were identified through websites, organisations, citation searches, and contributions from GGHH Pacific members. After removing documents that could not be retrieved or were not relevant, 71 documents were included in this review: 66 policy and planning documents and five risk assessments. Most (65) were published between 2020 and 2025, with six published between 2016 and 2019. The review included 11 national documents and 60 subnational documents (Figure 3; Table 1).

Figure 3: Document identification summary diagram
Record of document identification, screening and inclusion.

Identification of Documents			
Identification	Documents identified from: Websites (n:68) Organisations (n:2) Citation searching (n:7) GGHH Pacific members (n:4)		
	↓		
Screening	Documents sought for retrieval (n:81)	→	Documents not retrievable (n:4)
	Documents screened (n:77)	→	Documents excluded: Did not contain predefined keywords or variants (n:3)
	Documents assessed for eligibility. (n:74)	→	Documents excluded: Not relevant to healthcare operations (n:3)
	↓		
Included	Documents included in the review (n:71)		

Table 1: Included documents

	National	Subnational
Total	11	60
Jurisdiction		
Aotearoa NZ	5	1
Australia	6	59*

* ACT (n:3), NT (n:2), NSW (N:10), QLD (n:8), SA (n:2), TAS (n:3), VIC (n:22), WA (n:6), and Multiple States (n:3).

Assessing vulnerabilities in healthcare facilities in the context of climate change

Results

A total of 41 documents were grouped under the theme “Climate Hazard Identification and Vulnerability Assessments” and categorised across the key domains (health workforce; WASH and waste; energy; ITPs). Some documents appear in more than one category. Documents were also organised by jurisdictional level, national (five in Aotearoa New Zealand and four in Australia; Table 2) and subnational (one in Aotearoa New Zealand and 31 in Australia; Table 3), to provide a structured framework for understanding the current knowledge and practice of climate hazard identification and vulnerability assessments across the Pacific region.

Table 2: National climate hazard identification and vulnerability assessment
Total number of national documents that identified climate hazards and/or assessed vulnerability in key operational domains.

	Climate hazards of concern identified	Health Workforce	WASH and Waste	Energy	ITPs
Document*	9-17	**10,13-17**	10,11,13-16	10,11,13-16	10,11,13-16
Total	9	6	6	6	6
Jurisdiction					
Aotearoa NZ	5	2	3	3	3
Australia	4	4	3	3	3
*Reference Number					

Table 3: Subnational climate hazard identification and vulnerability assessment

Total number of subnational documents that identified climate hazards and/or assessed vulnerability in key operational domains.

	Climate hazards of concern identified	Health Workforce	WASH and Waste	Energy	ITPs
Document*	18-49	18, 20, 23, 25-28, 30, 32, 33, 37, 41-44, 46-48	18, 20, 25-29, 30-33, 39, 40-43, 45, 46, 48	18, 20, 22, 25, 27, 29, 30-33, 39, 41-43, 45, 46, 48	18, 20, 22, 25-33, 37, 40-42, 46-48
Total	32	18	21	19	22
Jurisdiction					
Aotearoa NZ	1	1	1	1	1
Australia	31	17	20	18	20
*Reference Number					

Discussion

Across the documents, two assessment subtypes became apparent: climate hazard identification and vulnerability assessments and national climate risk assessments.

Climate hazard identification and vulnerability assessments (CHIVAs) identify climate hazards and assess system or population vulnerability at a local, organisational or sectoral level, supporting fit-for-purpose local solutions. CHIVAs generally comprise two steps. The first is to identify relevant climate-related hazards (heatwaves, floods, sea level rise, cyclones, storms, bushfires, drought, and more) to a location or sector which may increase in frequency, severity or duration. The second step is to examine how exposed and sensitive a system or population is to a hazard, and how well they could cope with it.

National climate risk assessments (CRAs) look across all sectors for systemic risks, often aimed at guiding national policy development. CRAs use a systemic, integrated risk framework that assesses climate hazards alongside socio-economic drivers, demographic pressures, and cross-sector interdependencies. They evaluate vulnerabilities across physical, ecological, economic, and social systems, incorporate adaptation limits and thresholds, and draw on indicators such as sensitivity, adaptive capacity, system stability, and resilience. Supported by high-resolution modelling, authoritative datasets and scenario analysis, this approach produces consistent, integrated and scalable findings. Recent CRAs have also been much more transparent in their public sharing of knowledge, methods and data, ensuring national CRAs are rigorous and widely supported.

Our document review found that in the Pacific region, national Climate Risk Assessments set the foundation for regional practice. In CRAs, healthcare is assessed not as a standalone system but as one affected by cross-system interdependencies, e.g., Australia's "health and social support"[15] and, in Aotearoa New Zealand, "human"[12]. While CRAs consistently conclude that healthcare is moderately to highly vulnerable, they typically analyse healthcare indirectly. This creates a structural expectation that subnational CHIVAs must "translate" national insights into healthcare-specific, place-based risk profiles.

CHIVAs across states, regions, and districts generally draw heavily on national hazard maps, exposure assumptions and emissions pathways. They then assess the vulnerability of their local context by mapping projected hazards onto specific assets, service delivery networks, and community vulnerability profiles. This localisation is crucial because it is at the subnational scale that cross-system risks become operationally meaningful. For example, subnational assessments in this review identified:

- Exposure of health care facilities and services to climate hazards that threaten access, safety, and continuity of care
- Vulnerability of service delivery to disruptions in transport and access, particularly in rural and remote contexts
- Reliance on critical interdependent systems with limited redundancy, creating single points of failure
- Risks to essential clinical and operational functions from water insecurity and environmental stress
- Potential for compound and cascading hazards to overwhelm local health system capacity

Despite this critical role, document analysis found that the translation of CRAs into healthcare-specific subnational CHIVAs remains partial and inconsistent. Very few subnational assessments fully interrogate national datasets to identify healthcare vulnerabilities across all key operational domains. Most subnational outputs identify hazard exposure for facilities but do not extend the analysis to future risk emergence, feedback loops, amplifying factors, cross-system interdependencies, or cascading failures. Where these systemic elements are not carried downward, healthcare-specific vulnerabilities remain undercharacterised, even when national assessments show elevated risk.

We observed only isolated examples of subnational CHIVAs integrating cross-system interdependencies into healthcare analysis, such as linking flood modelling with transport network fragility to assess potential disruptions in patient access or emergency response times. These examples demonstrate emerging capability but are not yet routine practice.

CHIVAs face significant constraints, including variability in methodological guidance, data availability and granularity, modelling capacity and technical skills, and resourcing. These constraints limit the comparability of CHIVAs across jurisdictions.

Nonetheless, CHIVAs often excel in areas where national assessments are at times weaker, particularly stakeholder engagement, cross-disciplinary collaboration, and incorporation of

local and Indigenous knowledge. These strengths are essential for ensuring assessments remain contextually grounded and relevant to operational decision-making.

Taken together, these patterns highlight a clear regional trend: national CRAs provide a strong, system-level foundation but are limited in their applicability to healthcare services, while subnational CHIVAs carry the responsibility of making healthcare-specific vulnerabilities visible. This requires disentangling how national-scale hazards interact with the local structure, function, and essential domains of healthcare and translating systemic insights into actionable, place-based adaptation priorities.

Adaptation Across Key Operational Domains

Results

A total of 71 documents were grouped under the theme "Adaptation Across Key Operational Domains," organised by the key adaptation objectives they addressed in each domain (health workforce; WASH and waste; energy; ITPs). Some documents appear in more than one category. Documents were organised by jurisdictional level: national (five in Aotearoa New Zealand and five in Australia; Table 4) and subnational (one in Aotearoa New Zealand and 59 in Australia; Table 5) to provide a structured framework for understanding where adaptation is progressing, has been applied, or has delivered measurable resilience outcomes.

Table 4: National adaptation across key operational objectives

Total number of national documents that identified action across adaptation objectives in key operational domains (items 1.1–4.3).

Key Operational Domains	**1. Health Workforce**			**2. WASH and Waste**			**3. Energy**			**4. ITPs**		
Adaptation Objectives*	**1.1.**	**1.2.**	**1.3.**	**2.1.**	**2.2.**	**2.3.**	**3.1.**	**3.2.**	**3.3.**	**4.1.**	**4.2.**	**4.3.**
Document**	10, 11, 13-16	9-11, 13-16,	9-17	10, 12-17	10-17	10-16	11-17	11-17	11, 13-16	9 -17	9-11, 13-17	10, 11, 13-17
Total	6	7	9	7	8	7	7	7	5	9	8	7
Jurisdiction												
Aotearoa NZ	3	4	5	3	4	4	3	3	2	5	4	3
Australia	3	3	4	4	4	3	4	4	3	4	4	4

*Adaptation Objectives: (1.1.) Human resources; (1.2.) Capacity development; (1.3.) Communication and awareness raising; (2.1.) Monitoring and assessment; (2.2.) Risk management; (2.3.) Health and safety regulation; (3.1.) Monitoring and assessment; (3.2.) Risk management; (3.3.) Health and safety regulation; (4.1.) Adaptation of current systems and infrastructures; (4.2.) Promotion of new systems and technologies; (4.3.) Sustainability of operations.
**Reference Number

Table 5: Subnational adaptation across key operational objectives

Total number of subnational documents that identified action across adaptation objectives in key operational domains (items 1.1–4.3).

Key Operational Domains	**1. Health Workforce**			**2. WASH and Waste**			**3. Energy**			**4. ITPs**		
Adaptation Objectives*	**1.1.**	**1.2.**	**1.3.**	**2.1.**	**2.2.**	**2.3.**	**3.1.**	**3.2.**	**3.3.**	**4.1.**	**4.2.**	**4.3.**
Document**	20, 24, 25, 27, 29, 30, 32-36, 42-44, 46-64	20, 22, 24-27, 30, 32-36, 39, 41-48, 50-75	18, 20, 22, 24-27, 30, 32-36, 38, 39, 41-46, 48, 50, 51, 54-56, 58, 60, 61, 65-70, 74-76	18-20, 22, 24, 26, 29, 31-33, 35, 36, 41-48, 51-57, 60-64, 66, 67, 69, 70-72, 74, 75	19, 20, 22, 25, 26, 29, 31-33, 36, 41-43, 46, 48, 55, 61, 64, 66, 67, 76, 77	18-20, 24-26, 31-33, 36, 37, 40, 42, 43, 44-48, 51, 54-58, 61-71, 75	18-24, 26, 29, 31-33, 36, 40-48, 51-58, 60-63, 66, 67, 69-72, 75, 77	20, 22, 24-26, 30, 32, 33, 36, 42, 43, 46, 48, 51, 55, 61, 64, 66, 67, 76, 77	19, 20, 24, 26, 29, 31-33, 36, 37, 40-48, 54-58, 62-71, 75, 76	18, 20, 22, 24-26, 29, 31-37, 40-48, 50-57, 62, 65-73, 76, 77	19-26, 30-48, 50, 52, 55-65, 67-73, 75-78	19, 20, 24-26, 30-33, 35-37, 42-44, 46-48, 50-52, 54-77
Total	31	47	41	40	22	37	42	21	36	43	51	45
Jurisdiction												
Aotearoa NZ			1	1		1	1	1		1		
Australia	31	47	40	39	22	36	41	20	36	42	51	45

*Adaptation Objectives: (1.1.) Human resources; (1.2.) Capacity development; (1.3.) Communication and awareness raising; (2.1.) Monitoring and assessment; (2.2.) Risk management; (2.3.) Health and safety regulation; (3.1.) Monitoring and assessment; (3.2.) Risk management; (3.3.) Health and safety regulation; (4.1.) Adaptation of current systems and infrastructures; (4.2.) Promotion of new systems and technologies; (4.3.) Sustainability of operations.
**Reference Number

Discussion

In the Pacific, two distinct governance models shape how climate risks to health are understood and how adaptation occurs. Aotearoa New Zealand has the more unified approach. Its nationally coordinated health system, supported by the Pae Ora Act, enables adaptation to be planned and delivered through a single, system-wide strategy[9-13]. The Health National Adaptation Plan (HNAP) 2024–2027[10] integrates climate change into the wider determinants of health and aligns adaptation with national goals around prevention, equity, and sustainable care. Importantly, the HNAP was developed through cross-agency collaboration involving Te Whatu Ora Health New Zealand, Te Aka Whai Ora and the Public Health Agency, and informed by extensive stakeholder engagement, including a dedicated te

ao Māori (Indigenous worldview) workshop stream. The absence of regional or district adaptation plans is intentional: adaptation responsibilities sit centrally, and national direction is applied consistently across the system. As a result, adaptation efforts in Aotearoa New Zealand are more cohesive, with clear system-level actions (e.g., strengthening public health surveillance, enhancing climate-resilient primary care pathways, improving workforce preparedness) supported by a unified governance structure.

Australia's national government provides broad climate-risk framing through national risk assessments and adaptation strategies, but responsibility for health sector adaptation rests primarily with state and territory governments. This decentralised structure produces a far more varied landscape of adaptation activity. Several jurisdictions, such as NSW, Queensland, Victoria and SA, have developed statewide health-focused adaptation or climate-risk strategies, alongside hazard-specific initiatives for heatwaves, smoke, and vector-borne diseases. These plans typically outline actions such as expanding alert systems, upgrading hospital capacity, supporting community programs, strengthening monitoring during hazard events, or improving food and water safety during extreme weather. Other jurisdictions have embedded climate considerations within broader emergency management or resilience strategies, resulting in less direct focus on health system vulnerabilities (e.g., energy, WASH and waste, ITPs). Therefore, implementation across states varies significantly, with differences in planning detail, funding clarity, sector engagement, and timelines. This variation highlights ongoing opportunities for all jurisdictions to develop health system–specific adaptation plans that provide clear priorities, identify adaptation options, and outline pathways for sustainable investment.

Despite these structural differences, adaptation across the region converges around similar patterns. Most observed actions align with well-defined risks: heat stress, bushfire smoke, air pollution, shifts in infectious diseases, flooding, and service disruption. Yet these actions are generally operational, short-term, and small-scale, focusing on activities such as community education campaigns, early warning systems, emergency preparedness training, heatwave communication, and enhancements to public health surveillance. These measures are valuable and often form the backbone of local health resilience, but they remain limited in scope and do not address deeper structural vulnerabilities within health systems.

Structural adaptation, such as improving water security for hospitals, enhancing backup and renewable energy capacity, modernising infrastructure to withstand extreme events, transitioning to climate-resilient supply chains, or redesigning models of care to accommodate climate-related service disruptions, remains comparatively rare across the region. These challenges require cross-sector alignment with energy providers, water authorities, transport agencies, urban planners, and suppliers, all of which typically fall outside the direct control of health departments. Progress in these areas depends heavily on broader government action and coordinated investment, which is uneven and often slow.

Where adaptation has advanced more substantially, it is supported by strong governance signals (e.g., legislation, statewide adaptation mandates), clear regulatory expectations, and effective partnerships involving local authorities, community organisations, stakeholders, and private infrastructure providers. Examples include cross-sector heatwave strategies, integrated disaster-readiness programs, joint climate-health working groups, and place-based resilience planning in regions with high exposure to climate hazards.

Taken together, adaptation across the GGHH Pacific network shows growing momentum, increasing strategic clarity, and expanding engagement from both national and subnational actors. However, measurable resilience outcomes remain limited. Adaptation is still dominated by small, discrete initiatives; constrained by systemic dependencies; and not yet matched by the long-term planning, investment, and cross-sector coordination required for deeper transformation. Moving forward, the region will need to shift from planning to implementation, align national and subnational efforts more tightly, and build the partnerships needed to address structural vulnerabilities across WASH, energy, and ITPs. With these conditions in place, the region is well-positioned to advance toward more resilient healthcare.

Survey and interviews

Sixteen GGHH members participated in the surveys and interviews, 15 from Australia and 1 from New Zealand (Table 6). Their responses were analysed to provide an overview of climate adaptation knowledge and practice across the Pacific. The findings are organised under two key themes: (1) climate hazard identification and vulnerability assessment, and (2) adaptation across key operational domains.

Table 6: Survey and interview participants

Total number of, and jurisdiction of survey and interview participants.

	Survey		Interviews	
Total	16		7	
Jurisdiction				
Aotearoa NZ	1	Auckland (n:1)	0	
Australia	15	ACT (n:1), NSW (n:5), QLD (n:5), and VIC (n:4)	7	NSW (n:2), QLD (n:3), and VIC (n:1), and TAS (n:1)*

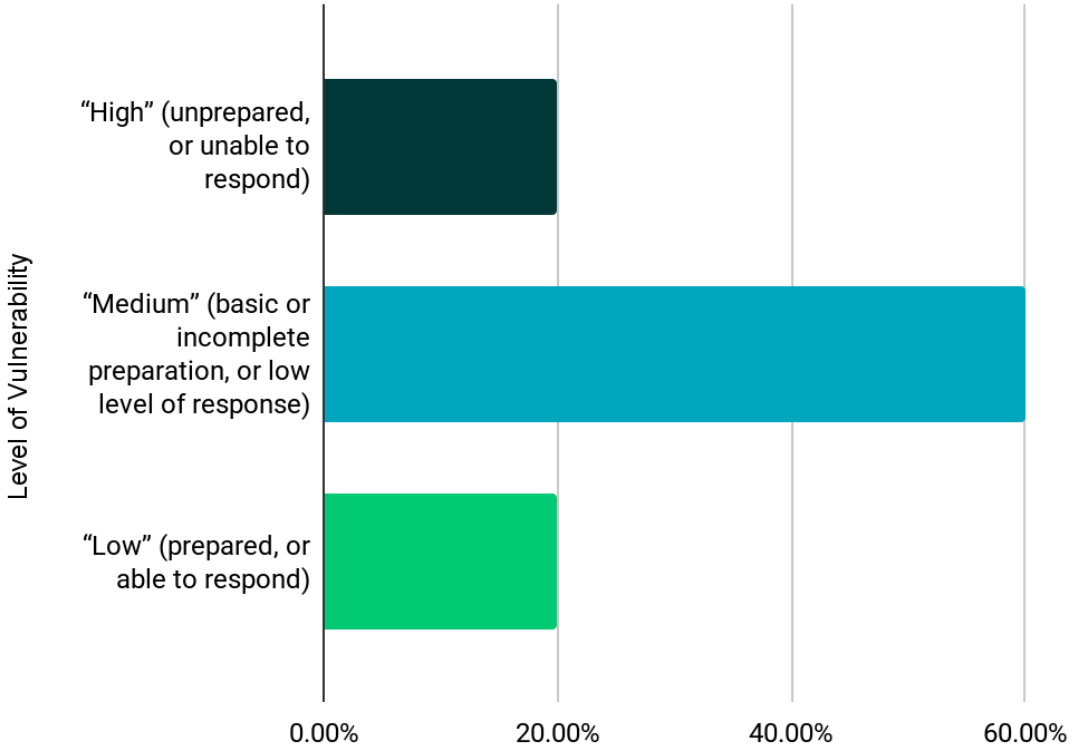
*Did not participate in the survey.

Climate Hazard Identification and Vulnerability Assessment

Our findings suggest that conducting CHIVAs across the region is an emerging practice amongst GGHH members (Figure 8). Of those surveyed, 44% have started completing assessments. Of those, 80% identified climate hazards of concern, and similarly, 75% identified vulnerabilities to those hazards in all key operational domains. Overall, most report a medium level of vulnerability, which WHO defines as “basic or incomplete preparation, or low level of response"[8].

We found significant variability in methods, coverage, and depth of practice in this area. This suggests that the practice is still evolving, moving from a focus on risk awareness to establishing consistent, repeatable practices integrated into everyday operations and planning.

Figure 8: Perceived vulnerability survey and interview participants
Reported level of vulnerability of facilities by survey participants.



The interviews shed light on the reasons for this variability. In different jurisdictions, CHIVA practices vary widely. Some organisations have implemented mandatory, coordinated assessments that serve as scalable models. Others are developing more structured approaches, while some have created simplified, accessible frameworks. Additionally, those in the early stages are making efforts to incorporate climate risk into their governance structures. This presents a valuable opportunity to adopt successful examples from national and peer organisations early in the process.

Consistently, CHIVAs were described as high-effort, multi-stakeholder exercises, particularly in large health services managing extensive asset portfolios and complex service dependencies. Where work has progressed, it was typically enabled by clear external drivers (e.g., targets, compliance expectations or post-event urgency), leadership sponsorship, and the ability to convene cross-functional input through stakeholder engagement. This confirms that CHIVAs are as much governance and coordination processes as they are technical analyses.

In cases where assessments were not conducted or were not comprehensive across all operational areas, several key barriers emerged:

- Limited capability and capacity
- Insufficient funding
- Competing priorities

- Logistical complexity
- Fragmented data systems
- Varied recognition of climate change as a risk

This context also helps explain why energy and ITPs are more frequently reported as vulnerable. These domains sit at the intersection of high operational criticality and greater data visibility (e.g., metering, infrastructure performance information, disaster planning), making risks easier to identify and translate into operational consequences. By contrast, vulnerabilities in domains such as WASH and waste, and workforce are often more distributed, less consistently measured, and more dependent on coordination across multiple teams, meaning risk can be real but harder to surface, compare, and prioritise without dedicated guidance and resourcing.

Taken together, the findings point to a region actively building CHIVA capability, with encouraging examples of leadership, despite uneven governance, data maturity, and limited capacity.

Adaptation Across Key Operational Domains

We organised responses for adaptation across key operational domains by: (1) health workforce, (2) WASH and waste, (3) energy, and (4) ITPs, and mapped progress for each adaptation objective using the survey stages: completed, in progress, planned, or not planned. This established a shared reference point for adaptation progress, enabling consistent comparison and benchmarking.

Survey responses suggest adaptation work is progressing across the GGHH Pacific region, with about 60% of respondents reporting climate adaptation-related policies or plans. However, most work is currently in the 'planning' or 'in progress' phase, more suggestive of intent and a growing foundation for coordinated action. Progress is most evident in the energy domain, where established monitoring and policy alignment have supported progress. The ITPs domain is also advancing as organisations integrate resilience into operational decision-making. In contrast, the health workforce domain and the WASH and waste domain remain comparatively underdeveloped.

1. Health workforce

Table 7: Summary of self-reported progress across adaptation objectives 1.1-1.3

Objective	Completed	In Progress	Planned	Not Planned
1.1. Human Resources	10%	20%	50%	20%
1.2. Capacity Development	10%	10%	50%	30%
1.3. Awareness Raising and Communication	10%	60%	10%	20%
*self reported by n:10 surveyed participants.				

Survey results suggest that health workforce adaptation remains emergent, with limited reports of completed actions (10%); most reported adaptation is either "in progress" or "planned". The main area of progress is communication and awareness, where a larger share of organisations report activity underway (60% "in progress"). This pattern suggests the workforce domain is currently oriented toward building understanding and engagement, rather than embedding climate resilience into workforce systems, capabilities, and accountability mechanisms.

Interview insights help explain why. Participants consistently described workforce-focused adaptation as competing with day-to-day service delivery pressures, rostering and scheduling constraints, and limited time to develop or deliver training. Several also noted the absence of clear, jurisdiction-wide standards for climate adaptation competencies and the limited integration of climate resilience into organisational performance, accreditation, or

professional development frameworks, which means local champions often drive this work rather than system requirements.

At the same time, the interviews point to a clear opportunity: workforce adaptation is one of the most scalable pathways, provided it is anchored in existing education and governance structures. Participants reported examples that highlight early but practical approaches. In NSW, initiatives such as the Green Star Calendar, which uses recognition mechanisms to normalise sustainability actions. When explicitly linked to resilience objectives, these programs were reported to translate "green" behaviours into everyday practices that reduce operational vulnerability. In Victoria, the development of staff learning modules and "lunch-and-learn" sessions, alongside work to build emission literacy, was reported to provide a platform for institutionalising awareness of how climate change affects service continuity. In Queensland, reported plans to embed sustainability into onboarding and medical training signal a shift toward integrating resilience into core learning systems.

Overall, this indicates that progress is being made in Awareness Raising and Communication for adaptation within the health workforce domain. However, there appears to be a lack of operational focus on Human Resources and Capacity Development, with limited reference to the practicalities of resilience, including support for staff mental health, other work health and safety training, and workforce planning for climate hazards and related risks.

2. WASH and waste

Table 8: Summary of self-reported progress across adaptation objectives 2.1-2.3

Objective	Completed	In Progress	Planned	Not Planned
2.1. Monitoring and Assessment	20%	30%	10%	40%
2.2. Risk Management	10%	30%	30%	20%
2.3. Health and Safety Regulation	30%	0%	40%	30%
*self reported by n:10 surveyed participants.				

Survey results suggest progress in WASH and waste adaptation is developing but remains uneven. Monitoring and assessment shows the greatest gap (40% not planned), while risk management is more active, with most organisations in progress or planned (30% each). Health and safety regulation appears more advanced, with the highest completion rate (30%) but still a substantial proportion planned (40%) or not planned (30%). Overall, responses suggest uneven progress across objectives.

Interview insights indicate that WASH and waste, particularly water security (including reliable supply, redundancy, and protection of water quality), are primarily addressed

through existing business continuity arrangements, often coordinated with other sectors. This may explain why the WASH and waste domain was identified as the least vulnerable in survey results. Participants also highlighted that climate change is inconsistently recognised as a significant risk. Climate change acts as a systemic risk that amplifies existing operational, clinical, financial, and environmental risks within the healthcare system. Moreover, the responsibility for addressing these risks is often fragmented across various areas such as facilities management, infection control, procurement, and contractors. This division creates coordination challenges, as even when risks are understood, the necessary data and responsibilities are spread across different teams without a unified governance or reporting structure.

There are positive signs of progress, primarily evident in waste management efforts aimed at reducing contamination risks, limiting emissions, and maintaining functionality during climate-related disruptions. Such efforts are receiving greater operational focus than WASH management. Queensland and Tasmania reported steps toward more foundational waste monitoring systems, with opportunities to strengthen data consistency through better coordination across services. In NSW, participants described vendor take-back programs and other waste-reduction initiatives, showing how circular approaches become feasible when procurement, suppliers, and operational teams are aligned. In Victoria, participants described a shifting focus toward integrating WASH-related climate risks into wider sustainability strategies and waste minimisation.

Overall, the findings suggest that current practices tend to approach WASH and waste through an operational and compliance lens, largely embedded in business continuity and intersectoral arrangements rather than treated as distinct climate risks. While this broadly aligns with the adaptation objectives, it falls short of fully recognising WASH security and waste management as material, system-level climate risks requiring sustained organisational attention beyond acute disruption planning.

3. Energy

Table 9: Summary of self-reported progress across adaptation objectives 3.1-3.3

Objective	Completed	In Progress	Planned	Not Planned
3.1. Monitoring and Assessment	10%	80%	0%	10%
3.2. Risk Management	10%	40%	30%	20%
3.3.. Health and Safety Regulation	10%	30%	30%	30%
*self reported by n:10 surveyed participants.				

Adaptation in the energy domain shows relatively strong implementation. Across all objectives, 10% of organisations report actions completed, while in progress ranges from 30–80%, indicating more activity underway here than in other areas. This is most evident for monitoring and assessment, where 80% report work in progress and a further 10% completed, with no work "planned" (0%).

By contrast, risk management and health and safety regulation show a more mixed spread across stages, with sizeable proportions still planned (30% for both) or not planned (20–30%). Overall, the data suggest energy is comparatively advanced because organisations are actively building and using monitoring foundations, making risks more visible and progress easier to track and demonstrate.

Interviews suggest this is partly because energy is often treated as business-as-usual operational governance managed both internally and externally through established controls, regulatory compliance, and continuity planning focused on acute disruptions. So, climate-related energy risks including energy security are less likely to be explicitly labelled or resourced at the service level for adaptation, even where vulnerabilities (e.g., grid dependency, backup capacity limits, heat stress impacts) remain.

Interview insights reinforce why this domain has progressed more than other domains. Participants described energy as one of the few areas where services can shift quickly from "risk awareness" to "actionable planning" because data are more available (metering, bills, audits), responsibilities are clearer (often centralised through facilities and engineering), and business cases are easier to justify through cost savings, reliability, and policy alignment with net zero goals and business continuity responsibilities. Jurisdictional examples illustrate both progress and variation, as well as how local contexts shape adaptation strategies. In Queensland, participants described integrating energy transition initiatives, such as solar, electric vehicles, and low-emission design within a defined sustainability strategy and governance framework, leveraging the clarity and data-driven strengths identified earlier. In NSW, structured climate-readiness programs foster capability development and operational resilience by linking monitoring to practical implementation. In Victoria, audits of heating, ventilation and air conditioning, and heat-stress performance testing using the Hospital Environmental Audit Tool (HEAT)[79] signal a shift from emissions tracking to climate-stress testing of critical systems, demonstrating how adaptation practice can evolve from routine monitoring. Meanwhile, participants in Tasmania are at earlier stages, yet they can accelerate progress by drawing on lessons and frameworks established in other jurisdictions.

At the same time, interviews highlighted constraints especially outside major metropolitan sites, including high upfront capital costs (particularly for older buildings), ongoing grid dependence, and limited capacity to integrate renewables and storage in some regional facilities. This means monitoring may be strong, but the step from tracking to risk-reducing infrastructure changes can stall without clear capital pathways and portfolio-level planning.

Overall, the findings suggest that adaptation in this domain has progressed because it is among the most quantifiable, fundable, and policy-supported areas of adaptation. The next step is to connect this work more explicitly to resilience outcomes, so energy adaptation becomes routine and embedded in asset planning and investment cycles rather than remaining project-based.

4. Infrastructure, technology and process (ITPs)

Table 10: Summary of self-reported progress across adaptation objectives 4.1-4.3

Objective	Completed	In Progress	Planned	Not Planned
4.1. Adaptation of Current Systems	0%	50%	20%	30%
4.2. Promotion of New Systems	0%	50%	30%	20%
4.3. Sustainability of Operations	0%	50%	20%	30%
*self reported by n:10 surveyed participants.				

Survey results suggest that adaptation in ITPs is underway but remains at an early stage. No organisations reported any completed actions across the three objectives, while 50% reported work in progress for each. The remaining responses are split between planned (20–30%) and not planned (20–30%), suggesting uneven readiness and resourcing. Overall, the pattern points to foundational progress across current and new systems and operational sustainability, but with limited evidence of completed work.

Interview insights help clarify what is driving momentum and what is constraining it. Participants consistently described ITP adaptation as a capital- and governance-intensive domain: progress accelerates when resilience is embedded into established asset pathways (capital planning, redevelopment approvals, standards), and slows when it competes with immediate clinical pressures and short-term funding cycles. Several noted that decision-making is also limited by the availability and usability of climate data at the project level, particularly the ability to translate hazard projections into practical design criteria that engineers, project managers, and procurement teams can apply consistently.

Barriers were consistent across settings, including ageing facilities (often decades old), challenges in incorporating climate risk into capital project design, and ongoing competition for funding against acute service priorities. In effect, the constraint is not awareness of infrastructure exposure, but the difficulty of converting that exposure into investable, standardised design and retrofit decisions.

Examples across jurisdictions illustrate different approaches to overcoming these constraints. Queensland participants report plans for building-by-building vulnerability assessments, which would provide a systematic evidence base to support retrofit prioritisation and investment justification. Participants in NSW are integrating climate risk considerations into hospital redevelopment, which embeds resilience in new builds while addressing legacy asset limitations. Victorian participants report working to incorporate climate risk into environmental sustainability reporting, helping keep adaptation visible and accountable within existing governance systems. Meanwhile, Tasmanian participants are focusing on advocating for the incorporation of the Australasian Health Facility Guidelines[82]

into their internal policies and procedures. This effort aims to establish a more standardised approach that will enhance the baseline resilience of future developments.

Overall, this suggests action in the domain is progressing but would benefit from institutionalised resilience through operational governance and regulatory compliance. This would include, as participants described, updating facility standards to include resilience criteria, linking adaptation requirements to funding and approval processes, and accelerating practical innovation (e.g., passive cooling, low-impact materials, water-efficient systems) so early activity translates into consistent, scalable adaptation embedded in core asset governance.

Summary

Across the four domains (objectives 1.1-4.3), organisations most commonly reported adaptation as in progress or planned, with fewer actions completed and around a quarter not planned, indicating developing but uneven progress overall. A consistent theme across the Key Operational Domains is that adaptation advances when embedded in what health services already do well: monitoring and performance controls, compliance and safety requirements, emergency management and business continuity. These settings provide clear mandates, familiar processes, and measurable outputs so work can start (and be evidenced) sooner.

At the same time, the distribution across “planned” and “in progress” suggests many organisations are still in a translation phase: moving from recognising risk to operationalising it. Discrete activities (plans, protocols, training, audits, and early system adjustments) are easier to initiate than the deeper work of embedding climate resilience into routine decision-making systems such as budgeting and prioritisation, workforce capability and accountability, procurement and supplier expectations and capital planning. In practice, this means adaptation often progresses as a set of projects or initiatives rather than as a normalised, organisation-wide practice.

Much of the adaptation activity described is therefore near-term and operational, such as preparedness and response planning, workforce communication and education, and incremental improvements to monitoring and procedures. These actions are necessary and often the most feasible entry points under current constraints, but they can remain small-scale and uneven when clinical demand, limited staff time, or unclear mandates reduce the ability to follow through and sustain implementation.

By contrast, structural adaptation is less common and progresses more slowly. Changes such as redesigning models of care to function during disruption, strengthening water security, building backup and renewable energy capacity, modernising ageing infrastructure, and shifting to climate-resilient supply chains require capital, longer time horizons, and coordinated decisions often beyond the health service (e.g., utilities, suppliers, transport, planning, and regulators). Interviews suggest this is where the implementation gap is most pronounced: risk recognition is increasing, but investment pathways and cross-sector mechanisms to deliver major upgrades are not yet consistently in place.

Where progress has moved further, the enabling conditions are consistent: clear governance signals, executive sponsorship, dedicated roles or time, and practical tools that reduce complexity. Participants repeatedly emphasised the value of “not reinventing the wheel,” seeking guidance that is specific enough to support action, but flexible enough to fit different contexts. Many also pointed to partnerships (including universities and other leading organisations) as a way to share the burden of technical groundwork, build capability, improve capacity and accelerate progress.

Jurisdictional differences in how progress is led also shape outcomes. Some settings benefit from clearer system-level direction that drives more consistent action; others progress through strong executive sponsorship; and many rely on committed individuals working within existing reporting and governance systems to keep adaptation visible. These leadership models are all contributing, but they also explain uneven maturity: adaptation progresses when accountability and resourcing are structurally embedded, rather than dependent on individual initiative.

Overall, the region is shifting from fragmented initiatives toward more structured climate-risk governance. Still, uneven mandates, fragmented data and ownership, and limited long-term investment pathways continue to constrain resilience outcomes. Future work is less about generating additional plans and more about institutionalising delivery, aligning mandates with funding, strengthening shared metrics and reporting, and building durable cross-sector partnerships to address structural vulnerabilities across energy, WASH, and waste, as well as infrastructure/technologies/processes, while lifting workforce capability to sustain change.

Section 3
Conclusion

Summary and Recommendations

Summary

This review consolidates current knowledge and practice in climate hazard identification, vulnerability assessment and adaptation across the GGHH Pacific Network. This work is progressing: awareness is high and activity is increasing. However, while capacity and capability are emerging, these practices are not yet cohesive or routinely embedded. Across Australia and Aotearoa New Zealand, members largely understand the hazards affecting their communities and services, and many are beginning to formalise that understanding through structured assessments and targeted actions. [2-4, 9-78] However, for a substantial share of organisations, this is emerging work, undertaken without consistent methodologies, established internal models, or sufficiently mature data systems to support repeatable, comparable practice over time.[82]

In highlighting areas where adaptation planning has lagged or been applied inconsistently, the findings suggest that gaps are not primarily due to a lack of intent, but to where vulnerability is harder to make visible, govern, and finance. Efforts are strongest where adaptation can extend existing operational routines, preparedness, business continuity, monitoring, and developments. This is because these activities fit within current roles, decision pathways, and compliance expectations. By contrast, progress is weaker where vulnerability is more distributed across teams and systems, where accountability is diffuse, and where solutions depend on longer planning horizons and actors outside health services' direct control. In these areas, implementation is more uneven, and resilience outcomes are less consistently measurable.

Taken together, the most important contribution of this work is the establishment of a shared reference point for risk recognition, system mapping, and benchmarking adaptation maturity across key operational domains. This baseline clarifies what is being assessed, what is being acted upon, and what remains under-addressed, enabling more coordinated progress across jurisdictions and organisations. It creates a practical foundation for reducing duplication, accelerating peer learning, and supporting a shift from fragmented initiatives toward institutionalised climate resilience embedded in governance, planning, and investment. The next step is to use this to prioritise action, action, strengthen capacity and capability, and make adaptation and resilience a routine practice across the GGHH network.

Recommendations

National

1 **Set shared national foundations**

Develop national guidance to support identification of climate risks and development and implementation of climate adaptation plans.

Establish common language, domains, and minimum expectations, while leaving room for jurisdictions to tailor to local contexts.

2 **Make national risk information decision-ready**

Provide accessible, health-relevant datasets and practical tools that translate risk into local planning and operational choices.

3 **Align national and subnational delivery**

Coordinate roles, expectations, and partnerships so efforts reinforce each other and adaptation is more consistent and collaborative.

4 **Enable continuous learning across jurisdictions**

Strengthen shared monitoring, evaluation, and reporting so adaptation improves cumulatively rather than as isolated projects.

5 **Support long-term, preventive adaptation investment**

Create pathways that shift funding from recovery toward risk reduction and structural resilience over longer time horizons.

Recommendations

Subnational

1 **Build on established practice**

Use proven frameworks and peer examples as a starting point, then adapt them to local hazards, service models, and capacity.

2 **Make Climate Hazard Identification and Vulnerability Assessments cyclical**

Treat assessment and review of risk and vulnerabilities as a routine capability that is revisited and strengthened over time, not a one-off project.

3 **Embed adaptation in core operations**

Link actions to existing systems (preparedness, continuity planning, and routine monitoring) so delivery is practical, owned, and sustained.

4 **Name dependencies and build partnerships early**

Clarify where resilience relies on external systems (energy, water, access, supply chains, digital) and engage the right partners to support longer-term solutions.

5 **Share learning to accelerate progress**

Exchange tools, insights, and lessons across teams and peers to foster collective improvement and reduce duplication.

Limitations

These findings should be read as directional rather than definitive. Differences in governance structures and responsibilities across countries and jurisdictions, limited survey participation, and constrained interview engagement mean that important perspectives may be underrepresented. Time and scope limitations also reduced opportunities to test, deepen, and collectively validate findings with participants. In addition, the WHO checklist used to structure the assessment may not fully capture variation in local capacity and context, and its terminology may not align consistently across settings and languages. As such, the results are useful for guiding next steps, but do not provide a comprehensive account of all activity or experience in the region.

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