

## Brief Report

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**Corresponding author:**

**Corresponding author:**

Liz Hanna,  
Email: [liz.hanna@anu.edu.au](mailto:liz.hanna@anu.edu.au).

# Barriers to Climate Disaster risk Management for Public Health: Lessons from a Pilot Survey of National Public Health Representatives

Hannah Marcus BSc, MSc<sup>1,2</sup>  and Liz Hanna PhD<sup>2,3</sup>

<sup>1</sup>School of Public Health, University of Alberta, Edmonton, AB, Canada; <sup>2</sup>Environmental Health Working Group, World Federation of Public Health Associations, Geneva, Switzerland and <sup>3</sup>Australian National University, Canberra, Australia

## Abstract

**Objectives:** This study sought to examine current national disaster risk management capacities, and identify governance barriers to strengthening national preparedness for responding to public health emergencies, associated with the anticipated climate-driven intensification of natural disaster cycles.

**Methods:** A mixed-methods online survey, assessing broader governance constraints to climate change adaptation (CCA) for public health, was distributed to representatives of national public health associations, and societies of 82 member countries under the World Federation of Public Health Associations. Specific questions relevant to disaster risk management capacities and barriers were analyzed as part of a narrowed focus on the CCA subdomain of emergency preparedness.

**Results:** Existence of some technology, infrastructure, and/ or human resources, necessary to develop early warning and other surveillance systems for climate-related health risks was reported by 9 out of 11 responding countries. However, 7 reported persistent limitations and/ or regional discrepancies. Most significant identified barriers to strengthening emergency preparedness at the national level included governance coordination challenges, and, in the case of many developing countries, technical, medical, and human resource shortages.

**Conclusions:** The development of new frameworks for intersectoral governance and large-scale resource mobilization will prove crucial to ongoing efforts to strengthen national climate-health resiliency and prepare for disaster-associated health threats.

## Introduction

Amidst the current climate crisis, atmospheric warming, sea level rise, mountain glacier retreat, and ocean acidification are all occurring at unprecedented rates.<sup>1</sup> The Intergovernmental Panel on Climate Change has warned that this will lead to increased tropical storm intensity, and greater frequency of floods, droughts, heatwaves, and fires in the coming decades.<sup>1</sup> Out of acknowledgement for the multifaceted health threats posed by extreme weather events, significant public health concerns have surfaced.

On a systems level, storms and floods threaten the viability of health systems by damaging critical services and infrastructure networks, reducing their capacity, and resilience in times of population health distress.<sup>2</sup> On an individual level, the health impacts of natural disasters are numerous. In the short-term, these may include physical injury, reduced nutritional status, increased respiratory and communicable disease spread, increased risk of water- and food-borne diseases, and chemical intoxication from storm-damaged industrial sites.<sup>2</sup> In the long-term aftermath of extreme weather events, further consequences may ensue. These can include adverse impacts on mental health due to disaster-associated trauma and prolonged conditions of precarity, uncertainty, and social insecurity.<sup>2</sup>

In response to this crisis, several international decrees called on national governments to develop plans to protect their citizens from climate-related health and other threats; a process formally referred to as climate change adaptation (CCA). Acknowledging the centrality of disaster preparedness to national adaptive capacity, the Paris Agreement has specifically called upon signatories to engage in regular vulnerability assessment, monitoring, and evaluation of climate-related hazards.<sup>3</sup> The World Association for Disaster and Emergency Medicine further recommends that all disaster and emergency response groups adopt a risk-based approach to emergency planning that prepares for, and enhances resilience to climate change.<sup>4</sup> Accordingly, the United Nations continues to frame early warning systems as a critical adaptive measure.<sup>5</sup> Thus, it has launched the Climate Risk and Early Warning Systems Initiative to support implementing partners.<sup>5</sup>

Concerted national leadership is imperative for public health preparedness and risk mitigation. However, the 2015 Climate Change and Health Policy Assessment conducted by the World Federation of Public Health Associations (WFPHA) found that only 5.7% of surveyed countries had made comprehensive progress in CCA for public health.<sup>6</sup> The more recent 2019 Global Outlook Report,<sup>7</sup> found that only 4% of actions coping with climate change targeted the health sector. Despite the health threats posed by disasters, neither report analyzed climate disaster preparedness. Thus, using pilot data from a small survey of national public health representatives, we set out to determine what, if any new knowledge could be derived on the subject of national climate disaster preparedness and its associated facilitators and barriers.

## Methods

In the context of a broader study examining governance barriers to CCA for public health, a mixed-methods online survey was designed. It consisted of 15 questions (multiple choice, short answer, ranking-based, and Likert scale-style) which collectively assessed the degree to which a range of institutional, economic/financial, technical, and sociopolitical barriers impede national progress in public health-targeted CCA. English, French, and Spanish versions of the survey were distributed through email to national public health associations and societies of 82 countries with WFPHA membership status.

Assuming a sub-focus on disaster preparedness, we analyzed responses given to questions relating to the development of systems and the procurement of resources for responding to natural disasters and associated health threats. Analysis involved (1) the quantification of response distributions for multiple choice and ranking-based questions, (2) the determination of an average significance rating for each of the disaster-relevant CCA barriers, which respondents were asked to rate (on a 1–5 Likert scale), and (3) qualitative analysis of any disaster-relevant comments made in short answer question responses.

Ethical approval for this study was provided by the WFPHA, whose members were recruited for participation. All contacted members were informed of the voluntary nature of their participation in the online survey. They were also given the right to alter or withdraw their survey responses at any point prior to the study's completion. Consent was obtained for verbatim quotes to be shared in the final report, provided that responses would be anonymized and any identifying information removed.

## Results

We achieved a response rate of 13% ( $n = 11$ ): Australia, Canada, Chile, Finland, Gambia, Israel, Italy, South Africa, Spain, Uganda, and Vietnam.

Table 1 highlights the results from the sections of the survey which elucidated information relevant to our assessment. A total of 9 countries (81.8%) out of the 11 countries stated that there exists the technology, infrastructure, and/or human resources necessary to develop early warning and other surveillance systems for climate-related health risks, 7 of which also highlighted the existence of limitations and/or regional discrepancies. Poor cross-sectoral/cross-scale coordination had the highest average significance rating for its effect on adaptive capacity, while non-monetary resource shortages were given high ratings primarily by the few low-income country respondents.

## Discussion

### Survey Findings

Arguably the most important and encouraging finding is the common response from 9 of the 11 countries (81.8%), that there exists the technology, infrastructure, and/or human resources necessary to develop early warning and other surveillance systems for climate-related health risks. This indicates that the majority of the surveyed countries are relatively well positioned to make robust health risk projections. However, the fact that 7 of these 9 countries also indicated that there are limitations and/or regional discrepancies in the existence/distribution of such technology, infrastructure, and human resources, generates cause for concern. Most notably, this illuminates the presence of underlying gaps in disaster-specific adaptive capacity. Such conclusions are backed by comments from survey respondents affirming gaps in data management capacities, a crucial facilitator of early warning system development. As stated by 1 respondent, “the Ministry of Health does not have clear climate related indicators to be incorporated in the data collection tools.”

Further assessment of the factors underlying such gaps reveals that poor cross-sectoral/cross-scale coordination can impede utilization of existing resources and capacities for climate-related health surveillance. Over half of the countries ranked this as the most significant barrier. The fact that lack of coordination across sectors (e.g., energy, agriculture, health) and scales (e.g., municipal, provincial, national) of government also received the highest significance rating amongst all barriers assessed further validates this notion. Also supportive is a statement from 1 respondent that “the information collected from meteorology is not routinely collated with information from the health management information system.”

While the constraining effects of shortages in non-monetary resources (e.g., medical supplies and equipment, medical personnel, technology for water filtration) appeared less significant, such shortages were disproportionately indicated by the lower income countries assessed. This verifies widespread concerns surrounding global disparities in disaster preparedness, the result of which would be a further exacerbation of existing climate injustices.

### Recommended Approaches to Public Health-Oriented Climate Disaster Risk Management

Recently, the international approach to emergencies and disasters has shifted from largely post-impact activities (i.e., ad hoc relief and reconstruction) to a more systematic and comprehensive risk management process.<sup>8</sup> This entails a wide range of measures which researchers and advocates have highlighted the growing importance of, particularly in relation to climate disaster preparedness. Many such measures fall under the broader agenda of health systems strengthening. Particularly in low- and middle-income countries, hospitals, and emergency departments (EDs) may be ill-prepared and understaffed to handle sudden surges in admissions, may lack the diagnostic tools to rapidly identify new infectious disease cases, and may have underdeveloped electronic medical record systems to facilitate rapid case tracking, triaging, and inter-facility patient transfers.<sup>8</sup> As a result, climate-health advocates have called for such actions as the promotion of “enhanced surge capacity,” the procurement of backup emergency medical supplies, the launch of new programs for quality improvement in ED settings, and further training of ED health personnel in responding to climate-related health crises.<sup>8</sup>

The aim to develop robust meteorological surveillance systems and climate-health hazard mapping capacities is of equal priority

**Table 1.** Summary of responses to emergency preparedness-relevant survey questions

Question	Response
<p>Does your country have the technology, infrastructure, and/or human resources necessary to develop early warning and other surveillance systems for climate-related health risks?</p>	
<p>What factors might prevent these systems from being better utilized for climate-related health surveillance/ what factors lead to insufficiencies in these areas? Please rank the 3 options in order of relevance (1 = least relevant, 3 = most relevant).</p>	
<p><b>CCA Barrier</b> Access to needed medical or other technology (e.g., diagnostic testing equipment, antibiotics, vaccines, or other drugs, equipment for air, food, or water quality inspection)</p>	<p><b>1-5 Significance Rating for Effect on Adaptive Capacity</b></p>  <p><b>AV. SIGNIFICANCE RATING: 2.27</b></p>
<p>Lack of knowledge of effectiveness or costs of different public health adaptation pathways (e.g., population-wide vaccination or prophylactic distribution, improvement of water testing facilities, construction of disaster-resilient physical infrastructure) to facilitate informed decision-making.</p>	 <p><b>AV. SIGNIFICANCE RATING: 2.55</b></p>
<p>Lack of trained health or other personnel to carry out public health adaptation responses.</p>	 <p><b>AV. SIGNIFICANCE RATING: 2.73</b></p>
<p>Shortages of non-monetary resources (e.g., medical supplies and equipment, technology for water filtration or agricultural production, etc.) needed for public health adaptation.</p>	 <p><b>AV. SIGNIFICANCE RATING: 2.73</b></p>

(Continued)

**Table 1.** (Continued)

CCA Barrier	1-5 Significance Rating for Effect on Adaptive Capacity
Lack of coordination across sectors (e.g., energy, agriculture, health) and scales (e.g., municipal, provincial, national) of government.	<p>AV. SIGNIFICANCE RATING: 4.45</p>

as an objective which demands inter-disciplinary collaboration. While launching public health awareness campaigns and community-wide disease prevention programs, may directly involve public health personnel, the underlying weather projections which can inform such responses require the generation of robust meteorological data by climate experts. Meanwhile, ad-hoc public health response measures may also require the expertise and involvement of diverse disciplines, such as engineers, and technical specialists needed to erect structurally-sound temporary housing units for displaced populations, design innovative sewage service, and solid-waste collection systems in temporary settlements, and repair roads and transportation infrastructures crucial to food and medical aid distribution.<sup>9</sup> In acknowledging the need for such an interdisciplinary approach, researchers have called upon governments to adopt a more holistic “emergency management perspective.”<sup>10</sup> This requires both a firm acknowledgement of the health and other risks posed by climate change, in addition to a deep-rooted commitment to interdisciplinary collaboration and interprofessional skill-building to optimize proactive and ad-hoc response capacities.

#### Application of recommended approaches to survey findings

When considering the various components of a robust disaster risk management strategy, it becomes particularly concerning that coordination challenges are so widespread across the surveyed countries, and that resource shortages prevail in some instances. As both effective intersectoral coordination and abundant technical, medical, and human resource supplies are fundamental to emergency preparedness, weaknesses in these areas warrant attention. Meanwhile, if long-term health risks are not prioritized relative to immediate health issues (a national shortcoming indicated by certain survey respondents) an “emergency management perspective” may fail to translate into concrete public health action by even the best-intentioned actors. In accordance with these identified weaknesses, public health stakeholders and climate-health advocates should consider, (1) Supporting governments in both leveraging existing and developing new platforms for organizational collaboration, multi-stakeholder dialogue, and networked governance, and (2) Amplifying resources in human capital and climate-health expertise, through the creation of new knowledge translation platforms, and the mobilization of more technical, and monetary assistance from high-income nations.

#### Limitations

In concluding this brief summary of the contributions of our survey to the knowledge base concerning national preparedness for

the health impacts of climate-driven extreme weather events, we must acknowledge the severe limitations of our findings. As this survey had only 11 respondents, the findings cannot be extrapolated or said to represent global trends in disaster risk preparedness. Rather, they unveil evidence applicable only to the unique country contexts of our survey respondents. Thus, these findings can and should be viewed as only preliminary data from which to launch a broader, international-level investigation of disaster risk and public health preparedness for a climate-uncertain future. Indeed, such an assessment will be imperative to developing new strategies for proactive risk mitigation, and to verifying, and elaborating upon the brief recommendations we have proposed.

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