



Research article

Towards a conceptual framework for place-responsive climate-health communication

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ABSTRACT

The challenge of adapting to climate change is now increasingly urgent as climate impacts accelerate. Several existing frameworks are widely used to guide the complex process of identifying and addressing climate-health vulnerabilities, however, none of the most commonly used frameworks center translational communication in their recommended processes, and existing frameworks function with varied success in responsiveness to local conditions. We propose a new conceptual framework for climate-health communication that is place-responsive and centralizes the involvement of stakeholders from local communities in the process of understanding and communicating climate-health impacts. Co-design of materials and processes to translate climate change science extends from the first through to the final stage of this framework. The proposed framework responds to calls for better science translation and interdisciplinary collaborations to enhance climate-health literacy at every level in communities, in order to prepare for the health impacts of a changing climate, and the local adaptive responses required.

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1. Introduction

Climate change has been called the single biggest health threat facing humanity [1] with consequences that will “shape the health of nations for centuries to come” [2]. Climate-health impacts threaten to reverse decades of gains in progress on global health, widening inequalities within and between regions, with those already most vulnerable to be most affected [3]. As the impacts of climate change on human health escalate, it is imperative that place-appropriate adaptation measures to address the health-related impacts of climate change be adopted in diverse local settings, globally. Existing work in this climate-health space shows that effective adaptation interventions can significantly reduce health impacts from climate change [4]. This suggests that strategies that facilitate and impel adaptation – such as better interdisciplinary collaboration, improved climate science and health translation and better climate-health communication with communities – are now more crucial than ever.

Though the widespread and increasingly serious implications to global health from climate change have been well documented [5–8], most extant research is impacts-focused, rather than concerned with adaptation or mitigation [9]. Research has also been oriented towards high-income countries, with disproportionately affected low-income settings under-represented [9]. Perhaps most importantly from a

public health perspective, there is a paucity of literature on the relative effectiveness of different climate-health interventions, including – the central concern of this paper – research that establishes the role and enabling capacity of communication-focused interventions in relation to climate change and health. Climate-health research has additionally tended to work in disciplinary silos, with a lack of truly interdisciplinary discourses hindering efforts to synthesize insights [10].

Those working in the climate-health space have called for initiatives to bridge such divides, both in research and in practice through improved communication on the ways that climate change affects health [11–13]. We conceptualize such communication as needing to occur at three sites: 1) through interdisciplinary collaboration, or ‘knowledge-brokering’ [14] between climate modelers and health researchers (for example, modeling future changes in precipitation, and working collaboratively to understand the varied health impacts of such changes under different emissions scenarios); 2) through more effective climate science and health translation (for example, conveying complex climate and health information to stakeholders who are not science experts, like health system managers); and 3) in strategies to improve public engagement through better place-specific communication on climate change and health. Although better science translation is one way to bridge barriers and enhance the effectiveness of adaptation processes, only a handful of studies to date have addressed ways to improve translation and communication

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at the climate-health nexus [15–18]. Other studies underscore the importance of place-responsive translation of the impacts of climate change [19, 20] but research in this space has not focused on health impacts specifically. In this paper, therefore, we build on calls for greater attention to be paid to communication processes in relation to climate-health adaptation, for better public health outcomes in the face of climate change.

We define “communication” broadly here as knowledge brokering and translation of technical expertise between disciplines and spheres of professional practice, as well as communication with, to, from and by climate-change impacted communities. We emphasize the need to move beyond the one-way, deficit model communication that has long been the standard mode of communicating science – a model which assumes that ignorance underlies the publics’ lack of support of and interest in issues in science and technology [21]. We consider here that best-practice communication is collaborative and participatory, facilitating a two-way flow of communication at each stage of a climate-health adaptation process. Participatory communication involves listening, dialogue, debate and collaborative decision-making on agreed solutions: not a unidirectional flow of information, but a bidirectional one [22]. We also emphasize place-responsiveness in climate-health communication because climate-health adaptation initiatives must respond closely to local conditions, from climate impacts and health system capabilities, to levels of literacy and the most suitable modes of community engagement.

Below we first appraise widely-used approaches to health adaptation planning, noting how these approaches incorporate communication, and describing their gaps in relation to communication/translation as we have broadly defined them here. In doing this, we establish the need for a novel communication-focused framework that addresses such gaps. We then offer a conceptual framework for climate-health communication to enable health sector adaptation and community preparedness across a range of environmental contexts. We conceive of this as an ‘overlay’, capable of bringing a communicational perspective to other widely used frameworks. The consistency of process between our framework and other current climate-health frameworks is a strength, enabling the infusion of best-practice communication into already existing climate-health adaptation guidance. Lastly, we discuss the steps needed for this proposed framework to be tested, refined and operationalized, as well as potential limitations.

2. The need for better climate-health communication

Health and environmental health management bodies, at state, national and global levels, have been developing frameworks to facilitate better understanding, management of and adaptation to the health impacts of climate change for three decades. An early review of such frameworks [23] indicates their disparate nature, and, importantly to the concerns of this paper, their generally scant mention of the need for communication. Building on this work, Hambling et al. [24] reviewed eleven climate-health frameworks and identified shared framework attributes relating broadly to environmental health, exposure, action/interventions and the effectiveness of adaptation responses. Some frameworks are formulated especially for specific local needs, for example, Boylan et al.’s [25] climate-health adaptation framework for the state of New South Wales in Australia. This tool is widely used for local climate change resilience and adaptation planning, however, like other commonly used frameworks, it does not intentionally incorporate knowledge brokering, translation or locally meaningful communication interventions.

Key conceptual frameworks currently used to guide policy and action in the climate-health space include the World Health Organisation (WHO’s) *Operational Framework for Building Climate Resilient Health Systems*, and the US Centers of Disease Control and Prevention (CDC’s) *Building Resilience Against Climate Effects* (BRACE) Framework.

These frameworks do nod to the importance of communication at several stages of climate-health adaptation work. For example, the BRACE framework calls for “Stakeholder engagement, communication, iterative learning” (6647) “a commitment to communicate... findings and updates to stakeholders” (6648) and a “community engagement process” (6648) [26]. However, there is little detail on who should undertake these processes or by what means, and what success markers might look like. Likewise, the WHO’s 2014 guidance on climate-health adaptation planning calls for “developing a communications plan” (11) that personnel then “communicate plan and implement” (11) [27]. Although an important acknowledgement, this recommendation appears to tend towards the kind of one-way, deficit model of communication, described above, which has been shown to be the least effective strategy for communicating science findings, especially in the field of health [28]. The role of communication is described in greater detail in the WHO’s (2015) *Operational Framework for Building Climate Resilient Health Systems* and its 2021 update, *Climate Change and Health: Vulnerability and Adaptation Assessment Guidelines*. For example, the latter prescribes “communications and awareness raising” (18) and identifying “how to best disseminate appropriate and constructive public service announcements” (17). It also calls for a “communication strategy on climate risks to health” that includes “community engagement and feedback” (20). Though we recognize that this is a move towards deeper consideration of communication and a more participatory approach, the site, nature, range of stakeholders, audience, objectives and outcomes of such communication nevertheless remain relatively undefined, nor is it clear what success markers might look like from a communication perspective.

To give an example of a climate-health adaptation initiative that centers on place-responsive communication, Health Canada has delivered successful climate-health adaptation projects producing locally specific communication materials and products resulting from extensive local consultation through its Climate Change Health Adaptation Program (CCHAP). This work was initiated in response to concerns from First Nations communities North of 60° and, later, also South of 60°. These communities were and are being directly impacted by climate change and were interested in leading research projects that would positively impact the health and wellbeing of their communities [29]. As part of the approach, community members learned about research and how it could be useful to them as well as how to analyze data and communicate with researchers and other experts – the kind of co-creation and knowledge brokering that we emphasize in our own framework. These projects were developed with local, Indigenous knowledge, building capacity within communities. Knowledge gained in projects was also subsequently applied in other similar communities. While these projects have been successful in their approach to working with local stakeholders and harnessing their knowledge to build place-based capacity, it appears they have paid less attention to developing detailed insights into the regional and subregional impacts of climate change [20] and the use of locally-relevant climate data has been limited. Our framework is underpinned by research that integrates detailed intersectional social, health and demographic data with zoned climate projections. Put simply, our framework prescribes the integration of rigorous, locally-specific science and social science data into knowledge brokering and translation processes: if any of these components is missing, effective adaptation may be undermined.

The need for new conceptualization to support communication and place-responsive approaches in the climate-health space is strongly supported by observations from climate change communication and environmental behavioral research. Literature in these spheres of research has noted that anchoring a global problem in narratives about local impacts most effectively enhances people’s climate change understanding and engagement [19,30]. Climate communication research has correspondingly called for more place-

based perspectives in the practice of communicating climate change [31]. On climate and health specifically, some literature also indicates that framing climate change as a public health issue may enhance public support for adaptation and mitigation efforts [32,33]. For most messages around climate, participatory communication – rather than one-way deficit-model communication – is regarded by publics as more empowering and likely to result in ongoing engagement [34,35]. Health communication research shows that for communities that have been economically and socially marginalized in particular – those most exposed to adverse climate-health outcomes – genuine co-creation of health communication is the most authentic and effective avenue for engagement [36]. To date, however, as discussed above, existing frameworks tend not to sufficiently describe or embed the kind of interdisciplinary work that meaningfully brings together climate communication, science translation, and communicating health impacts for local communities. To be effective, such work would also need to be truly responsive to place-based conditions, including the socio-economic context in which changes to climate unfold. By this we mean that levels of disadvantage and isolation, and conversely, economic advantage, play a crucial part in determining adaptation possibilities. For example, recommending that people turn up air conditioners at home or take public transport to a cooled public space will only be a pathway for coping during a heatwave if households have air-conditioning, and can afford to run it. If cooled public spaces exist, but effective public transport does not, other individuals may not be able to access them. Climate science translation for health must consider such fine-scale socio-economic factors, ideally within a framework that is participatory, and that builds on understandings offered by existing projects and frameworks. Such a framework is therefore much needed as climate change impacts accelerate globally.

3. CCLEAR-Health: a new climate-health communication conceptual framework

At present, a lack of integration of climate science communication in health-sector management in many local contexts is a barrier for

adaptation to current climate impacts and preparation for those to come. A knowledge brokering approach can effectively bridge gaps between sectors (eg: climate science to health) and between roles, (eg: health governance decision making and health operational roles). At the same time, such an approach, when reciprocal and participatory, can promote better engagement, potentially catalyzing adaptation actions by communities [37,38]. It is also critical to thoroughly engage with local lived experiences to ensure that climate-health information is truly place-responsive and not imposed from outside, centrally involving community in decision-making. This is particularly relevant in First Nations communities. Experience in Australia, for example, shows that authentic and respectful engagement is more likely to empower and involve Indigenous communities in local action [39].

To be resilient and empowered in the face of climate change, communities must also be climate-health literate. Following Azevedo and Marques' model of climate literacy [40] and Reismann et al.'s climate-specific health literacy [41], we define climate-health literacy as an individual being in possession of basic factual knowledge about Earth's climate system and anthropogenic changes to it, and also being aware of current and future impact of these changes on health in their local context. This includes climate impacts on mental health. We have named the framework we describe below the CCLEAR-Health framework, denoting: Communicating Climate to Enable Adaptation Responses for Health. CCLEAR-Health is centered on communication and translational processes and outputs to support empowerment through climate-health literacy. This framework is interdisciplinary by nature, requiring professionals and researchers from disparate disciplines to work together (see Table 1), and also necessitating expertise in engaging communities in the process (Fig. 1).

As identified in the graphic above, CCLEAR-Health locates and emphasizes the sites of communicational processes in several of its recommended stages. We expand in the graphic below on the kinds of communicational processes CCLEAR-Health underscores, noting that such processes are not mutually exclusive, and may overlap in some cases (Fig. 2).

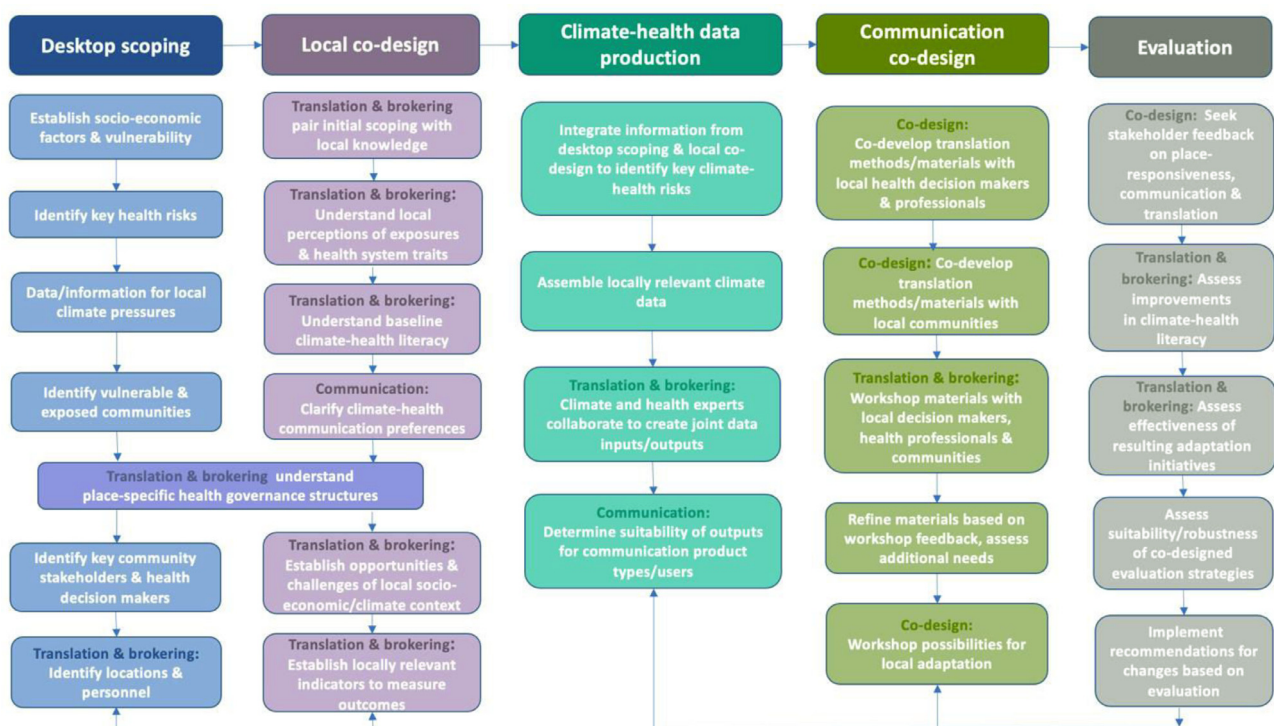


Fig. 1. The CCLEAR-Health Framework: Communicating Climate to Enable Adaptation Responses for Health. This framework's five steps are similar to those of some other widely used frameworks, and it could therefore be used in conjunction with frameworks such as BRACE.

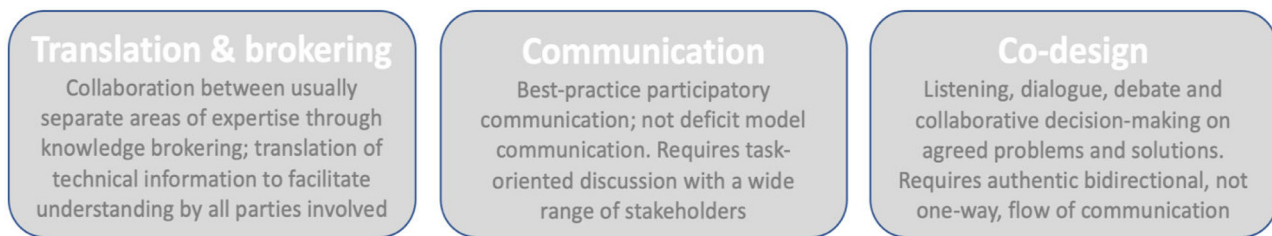


Fig. 2. Communicational processes within the CCLEAR-Health Framework.

3.1. Desktop scoping

The framework tasks begin with a desktop scoping to identify the most disproportionately affected communities already exposed to climate impacts. This ensures focus on those communities in greatest need of adaptation planning (based on methods like those identified by Pradyumna and Sankam [42]). CCLEAR-Health explicitly incorporates consideration of socio-economic factors mediating vulnerability and exposure. Basic, preliminary socio-economic information and climate data is sourced from government bodies, meteorological authorities, climate modeling research groups or digital databases. Identifying key stakeholders, including community “champions” for knowledge brokering is also an important part of this initial stage.

3.2. Local co-design

The user-centered, participatory approach proposed here is anchored by baseline knowledge of projected climatic changes. At this stage, knowledge brokering is crucial. For example, health professionals’ lack of knowledge has been found to impact their willingness to communicate with patients about climate change and health, despite their having observed a range of impacts in their communities [43]. Effective knowledge brokering could empower health professionals to translate such information appropriately for patients. The co-design process is envisaged as a series of workshops that foster mutual understanding and collaborative development of engaging, culturally appropriate and place-relevant approaches to climate-health communication. Co-design also involves consideration of challenges and opportunities within the local context and a refined understanding of existing health governance structures. Protocols for evaluation of process outcomes should also be co-designed at this stage.

3.3. Climate-health data

At this point, climate and health information from the desktop scoping and local co-design stages are brought together through a dedicated translation process between professionals working in different disciplines. Integrating disparate spheres of expertise may be technically difficult. Firstly, trying to make very different data types compatible with each other is complex, second, some regions may lack certain types of health and/or climate information. This stage therefore calls for close collaboration between climate scientists and health professionals who will not necessarily share a common language. Here, the knowledge brokering and bidirectional communication that is characteristic of our framework is particularly crucial.

3.4. Communication co-design

This stage similarly involves co-design: here between experts and community using the example outputs produced in the previous stage. Participatory communication must be deployed for co-design of translation methods and materials. This may include face-to-face workshops bringing together, for example,

community members, climate scientists, local government and health sector leaders. Such workshops would use collaborative decision-making to agree on priority adaptation possibilities and corresponding resource needs. Workshops would also co-produce communication initiatives and materials to enable better climate-health literacy.

3.5. Evaluation

At this stage, the evaluation indicators co-designed in the second stage of the framework are implemented. This evaluation will also establish the efficacy of the framework for improving climate-health adaptation over time. Recommendations and other feedback emerging from the evaluation process may also indicate further research needs, inform adaptation pathways and identify adjustments required.

4. Benefits of a framework for enhancing climate-health communication

The current relative disconnect between climate science experts, health professionals and communities is just one of the challenges to mitigating climate change-related health impacts at the local level. Reporting on progress in relation to climate-health adaptation indeed shows there is “a significant global adaptation gap in health” and that current efforts are “well below the level required to significantly reduce negative health outcomes” (p. 15) [44]. While we acknowledge that better communication can by no means bridge this gap alone, the broad communication processes we have described here are essential for impelling adaptation (which must also be appropriately be supported by funding and personnel with sufficient time and expertise). Climate-specific health literacy has indeed been found to be integral to the facilitation of health benefits as part of adaptation planning and climate change mitigation [41].

The CCLEAR-Health framework also requires the collaboration of multiple professions, answering the call – noted above – for climate-health work to go beyond the bounds of disciplinary silos. Our proposed framework requires multiple different actors to bring disparate knowledge domains into conversation, as illustrated in Table 1. We also identify in this table what the markers of successful collaboration might look like.

Environmental change already disproportionately affects more at-risk communities with deficits in capabilities and resources. Given that improved understanding of climate change and its health risks is a precursor for early adaptation planning, a framework that centers translation and communication tailored to communities may directly assist in reducing such communities’ health risks.

A possible co-benefit is that improving climate-health literacy may also serve as an impetus to climate change *mitigation* actions. Research shows that climate change literacy is an essential antecedent to climate concern and action [45]. The literature also suggests that a health frame is effective for opening conversations about climate and environment with those individuals who have less climate concern, or indeed who are resistant to messages about climate

Table 1.

Fields of expertise and capabilities needed to support the proposed framework. Additional expertise and personnel may be required, as dictated by local conditions.

Areas of expertise	Roles	Success markers
Climate science	Climate modeling and analysis	Regional climate conditions are better understood
Demography	Providing understanding of demographic and socio-economic characteristics	Current vulnerability and future population exposure to climate impacts are understood
Geography	Spatial analyses, mapping	Spatial concordances allow definition of areas of responsibility
Health (clinical)	Attribution of climate-related health conditions	Health specialists distinguish which diseases or conditions result from, or are exacerbated by, climate change
Health (management)	Planning for health service adaptation, support policy adjustment/adaptation	Health managers/policy makers are better able to incorporate climate change science into decision making
Community facilitation	Local stakeholder mapping, drawing community stakeholders together	Social connectivity assists in working through relevant local issues and adaptation planning
Communication and climate-health literacy	Translation of climate science and health impacts, facilitating participatory communication, producing communication initiatives and materials	Community members and health professionals have better understanding of basic climate science and adaptation needs
Local government	Facilitation of local health services and associated infrastructure, support for policy adjustment/adaptation	Locals are provided with fit-for-purpose health services to facilitate adaptation to health impacts of climate change

change. Additionally, medical professionals are considered “trusted voices” which can credibly advocate for climate and health policies, both within their communities, and across national boundaries [46]. Empowering health professionals with climate science and science translation knowledge can therefore support climate action advocacy.

Ultimately, to be effective for catalyzing adaptation, any conceptual framework must be workable at a scale that is locally relevant. As climate communication research has established, the global problem of climate change is best addressed with local nuance. By centering the participation of communities, the CCLEAR-Health framework is fundamentally place-responsive, designed to facilitate buy-in from local communities and authentic co-creation of adaptation initiatives.

5. Conclusion

To test and refine the CCLEAR-Health framework, on-the-ground case studies in communities characterized by a variety of socio-economic conditions and differentially exposed to climate-health impacts will be essential. The framework will need to be trialed in rural versus urban settings and in areas representative of different climate zones. Because the deep emphasis on participatory communication in this framework is new, it will need to be operationalized over several preliminary rounds, allowing evaluation and feedback to improve each step and identify remaining knowledge gaps. In this way, the framework will evolve and be flexible enough in different regions to avoid maladaptations. Over time, this process may assist in developing climate-health indices: [47] specific metrics that draw in climate and health data, and are designed to be highly responsive to place.

The work described here is no doubt challenging. Challenges include bringing together disparate fields and drawing out fit-for-purpose information. This work may require a glossary of terms to support a “shared language” [48] between experts and non-experts who will necessarily be speaking different ‘languages’. Funding such work will also be a significant and ongoing challenge. However, broader economic and climate risk analysis – not currently incorporated into the framework – may show that mitigating the health impacts of climate change early costs less than addressing them in the longer term. Future work could examine in detail the economic impacts of inaction (and also maladaptation) in the climate-health space. An additional challenge is the urgency and broad scale on which climate-health impacts must be addressed. This will necessitate thorough understanding of the problem at all levels of society and buy-in for the work ahead. Only thoroughly climate-health

literate publics, and a climate literate health sector, will be equipped for this challenge. Tailored, place-specific, collaborative communication and translation of the climate challenges to come will be essential enablers of this process.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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