



# The power of indicators: local health departments responding to climate change

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Local public health departments form the backbone of the US health system, and the hazards associated with a changing climate create health and preparedness challenges that are often unfamiliar to the workforce in many of these hardworking agencies (1-3). This is occurring in a context in which America's local public health and preparedness efforts have been underfunded for more than a decade (4,5) and in which priorities among health and preparedness have sometimes been at odds (6). The COVID-19 pandemic has brought these issues sharply into focus. At the same time, it is now well recognized that upstream health determinants and complex sectoral interconnections play an important role in climate-relevant health outcomes. Such connectedness requires public health agencies to partner with others in ways many may not have previously done (3,7,8). Tracking and monitoring public health adaptation effort can serve as institutional incentive to build formal and informal governance mechanisms needed to develop these collaboration arrangements (9). It can also help build local public health capacity to adapt, ensure adequate resources are allocated and local workforce is appropriately trained. This makes tracking and monitoring indicators a powerful tool for local health departments.

The framework for indicators to guide and monitor climate change adaptation in the US Pacific Northwest proposed by Doubleday *et al.* (2020) is therefore a welcome contribution to the practice-focused literature (10). These

authors build on a substantial body of existing climate change and health adaptation tracking and monitoring literature. More than a decade ago, Frumkin *et al.* applied the Ten Essential Services (TES) model of the Centers for Disease Control and Prevention (CDC) employed by Doubleday and colleagues to the challenges presented by climate change (11). More recently, we updated this work and, like Frumkin and colleagues, emphasized particularly the importance of governance arrangements to coordinate health-adaptive actions across agencies and with other actors (8). Numerous other research efforts have examined perspectives on climate-health adaptation tracking and monitoring, including the work of the Tracking Adaptation to Climate Change Consortium (TRAC3) setting out guidelines for consistent, comparable, comprehensive, and coherent global adaptation measurement and reporting (12,13), and The Lancet Countdown Tracking Progress on Health and Climate Change establishing 41 standard public health and climate change indicators that are being monitored worldwide (3,14). In the US, Moulton and Schramm reviewed efforts to assess and strengthen climate-related health surveillance and found a patchwork of local, regional and national systems without a systematic framework (15). This points to the value of a coherent structure based on the familiar TES as proposed by Doubleday *et al.* (10).

We distill from this literature four considerations for

health adaptation monitoring that suggest some strategic future directions for implementing such a framework more widely at the local level in the US.

### **Monitoring for whom and for what purpose?**

In examining lessons for systematic, comprehensive climate health surveillance, Moulton and Schramm highlight the need to identify monitoring objectives, end-users and their needs (15). What is the goal of this newly-proposed framework, who is likely to use it, what data are required, and where can these data be found? Doubleday *et al.* identify the goal of their proposed framework as building “state and local health agency capacity for effective climate change adaptation (10).” Among the most fundamental of indicators is a health agency’s monitoring capacity to carry out surveillance of climate related health threats (TES 1) and to diagnose and investigate these threats (TES 2). However, as pointed out by Moulton and Schramm, climate-health surveillance systems themselves are often fragmented and inadequate at the local level; both surveillance and the capacity to carry out surveillance, need to be strengthened (15). Monitoring the capacity of public health agencies to implement surveillance is likely to make clear the weaknesses in surveillance itself, and a positive result of using a formal indicator framework could be strengthening of both surveillance capacity and outcomes. The primary end-users for this indicator framework are likely to be public health department staff. (In fact, we recommend that interested public health practitioners access the supplemental material provided, particularly Table D. Supplement to Table 1 outlining “how to” implementation steps to put the proposed indicators into practice.) And one of the strengths of this framework is that it has been critiqued via key informant interviews with agency practitioners in Washington and Oregon and tribal areas to determine their needs and feedback. One way to ensure this framework receives additional feedback and fine-tuning would be through the CDC’s ongoing “Climate-Ready” programs which use the Building Resilience Against Climate Effects (BRACE) framework to strengthen local public health agency response to climate change (16-18). Meanwhile, as Moulton and Schramm point out, while public health programs are often the end-users of climate and health indicators, the number of end users in other agencies is likely to grow (15). In addition, sources of data also require definition and are likely to come from multiple agencies. A formal monitoring framework is likely

to be helpful not only in building public health capacity to monitor but also in building relationships with these partners.

### **What is the scope of health, and how to collaborate across agencies?**

The determinants of health are vast and cross sectoral boundaries, particularly at the local level. For example, as part of defining relevant global climate and health monitoring indicators, Watts *et al.* propose to broaden the formal definition of what constitutes health adaptation to include, *inter alia*, disaster preparedness and emergency response as ‘health-related’ (3). How broad is the definition of health under this new indicator framework, and how will collaboration be done across agencies? Doubleday *et al.* address this in part through communication, coordination and community partnership indicators (TES 4), and an indicator regarding policy development that has been tailored to reflect preparedness and response (TES 5). Extreme weather constitutes a primary source of climate-relevant hazards to health; when surveyed about their major climate concerns many localities report preparedness for extreme heat, flooding and storms (2,19). In practitioner key informant interviews, concern to enhance cooperation across public health and preparedness and response agencies—and the lack of emergency response capacity in public health departments—was highlighted. Indicators that monitor whether such communication and coordination does occur may help to provide incentive for it; it may also serve to show the institutional and other challenges and barriers to achieving this and point to solutions.

### **What workforce training, resources and capacity?**

Moulton and Schramm point out the need for a funded and trained workforce to achieve effective monitoring (15). What are the core competencies needed for the public health workforce, and what resources are needed to achieve this? As Doubleday *et al.* report, their practitioner key informants commented on the need for training (TES 8) to understand climate and health holistically and avoid being limited to event- and hazard-based reactive responses. They also noted “overwhelming” lack of resources, prompting desire to explore non-traditional funding sources. While recognizing that CDC’s “Climate-Ready” programs have only been able to provide direct funding for a minority

of states, cities and tribes, they have produced and disseminated tools including the well-regarded BRACE assessment framework, guidance documents, training webinars, communication and media toolkits, among others, that are designed to support health departments and the public health workforce in general (20). These resources are available now and further investment in the CDC Climate Ready program could build on its expertise to support an expanded effort. One way to do this, for example, would be to fund a 50-state program; another way would be to open the program to additional tribes and/or cities (currently only San Francisco and New York City have participated). Our previous work included similar recommendations, such as enhanced outreach and capacity building for cities (2). Rudolf *et al.* reported an example of this type of work: the Public Health Institute's learning collaborative on climate change received grant support from the Kresge Foundation to provide networking, learning activities, communication platforms and information sharing to a group of 12 local (city and county) health departments across the country (1). With modest funding (no more than \$40,000 per health department), their collaborative succeeded in building internal capacity for a broad range of climate and health projects, and found value in city-to-city networking (1).

### **Do local public health agencies have a role in climate mitigation?**

In developing a global set of climate and health indicators, Watts *et al.* propose indicators related to reducing the population health impact of activities that generate greenhouse gases (GHGs), creating 'co-benefits' to health from lower disease burdens (3,14). In what ways may public health influence GHG reduction, and are local level indicators useful in tracking public health capacity to help identify health co-benefits? Doubleday *et al.* state clearly that their framework is aimed at climate adaptation, however, they do recommend two mitigation indicators: including mitigation in health impact assessments (HIAs) (TES 5), and monitoring of GHG emissions from the health sector (TES 6) (10). For consideration in subsequent rounds of feedback on this monitoring framework, a case could be made to include more explicit and proactive indicators related to health department roles in identifying co-benefits at the local level, particularly for larger urban localities. These could include indicators of public health collaboration (e.g., participation in estimating health co-benefits as part of HIA implementation) on such programs

as active transport, food waste reduction, addressing energy poverty, and avoiding unintended consequences (e.g., excess heat-reduction related air conditioning demand adding to emissions) (3).

Carefully-chosen indicators, well-structured monitoring frameworks, and well-designed data-gathering systems are integral components of information systems needed to address all types of public health problems. They allow tracking of progress (or lack thereof) on health outcomes that inform evidence-driven programs and policies. Indicators can help public health agencies achieve the innovative responses that effective climate health adaptation will require (8,9). Just as Doubleday *et al.* gained valuable insight from practitioners in developing their proposed indicators (10), further input from practitioners using the indicators will provide lessons of experience and examples of adaptive management (21).

Moving forward, well-defined indicators and monitoring frameworks are likely to play an essential role in successful local health department response to climate change in many ways, including by:

- ❖ Helping the public health workforce to interact more collaboratively, involving new ways of working with a variety of data partners, providers and end-users;
- ❖ Linking public health formally and informally through collaborations and communication to other sectoral agencies, including disaster preparedness and emergency response;
- ❖ Identifying training needs and seeking resources, which may be available through existing governmental and non-governmental sources including climate-health networks; and
- ❖ Engaging public health proactively in mitigation, particularly estimating health co-benefits associated with locally-relevant GHG mitigation policies.

The need to build public health capacity to address climate-relevant health outcomes is great, and the potential contribution of a well-designed framework of indicators to guide and monitor adaptation is large. But it is an urgent challenge. The world has reached a climate crossroads where strong mitigation efforts to transition away from fossil fuels are needed to reduce GHG emissions within the next decade, and to build resilience to a warmer, more extreme and less predictable climate system. The current COVID-19 pandemic has demonstrated weaknesses in both public health and preparedness and response capacity in the US. This should serve as an alert for the inevitable

climate-related health impacts of the future. Indicators are a potentially powerful tool for helping build capacity and encouraging collaboration in America's local public health agencies.

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