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Developing equitable health and climate solutions: insights from the field

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E-mail: emaibach@gmu.edu**Keywords:** climate change, health, solutions, equity, case studies

Climate change is reshaping our physical and social world in countless ways (Reidmiller *et al* 2018). The most universally relevant of these impacts is the harm it is causing to human health and to the underlying environmental conditions necessary to sustain human health and well-being. Climate change is already harming human health in communities across America and the world.

Research on the impacts of climate change on human health is a relatively new and a surprisingly under-funded element of the climate science research enterprise (Ebi *et al* 2016). Although many pressing research questions remain unanswered, the broad outlines of what is known are clear and profoundly important.

Climate change is already harming human health in communities across America and the world—in myriad ways large and small (Paavola 2017, Ebi *et al* 2018, Masson-Delmotte *et al* 2018, Watts *et al* 2019). These harms are the result of the increasing frequency and intensity of heat waves and other extreme weather events like hurricanes and floods, worsened air pollution, increases in vector-borne diseases, contaminated food and water (including algae blooms), mental health impacts, and reduced nutrition and food security—all of which are caused or exacerbated by our changing climate (Ebi *et al* 2018).

If left unchecked, these harms are almost certain to become far worse. Climate change has been described as a public health emergency and the 21st century's greatest threat to public health (Solomon & LaRocque 2019; Watts *et al* 2015). In a recent report, experts assembled by the Intergovernmental Panel on Climate Change (IPCC) concluded that, to protect human health and well-being, 'it is necessary and even vital to maintain the global temperature increase to below 1.5 °C' (Masson-Delmotte *et al* 2018). Even if the nations of the world achieve their stated goal of limiting global warming to below 2 °C—an outcome that is very much in doubt—serious public health harms will continue to escalate for many decades to come (Masson-Delmotte *et al* 2018).

These public health harms are unfairly distributed. In communities around the nation, and in nations around the world, the 'frontline' communities—the communities whose members are being hurt first and worst, and who have benefited least from the economic prosperity of the fossil fuel era—are typically low-income, marginalized ethnic, and/or racial minority communities (White-Newsome *et al* 2018, Crear-Perry and McAfee 2020). This profound inequity is also intergenerational: today's youth—and future generations—will suffer a much greater cost to health and well-being than their parents and grandparents (Treves *et al* 2018).

1. Climate solutions are health solutions

A critically important and often overlooked fact in this dire situation is that climate solutions are also health solutions. Many of the measures that must be taken to limit global warming—especially accelerating the transition from fossil fuel-based energy to clean, renewable energy—will almost immediately benefit human health and well-being. These measures have recently been codified into a Climate, Health and Equity Policy Action Agenda that has thus far been endorsed by nearly 200 climate and health organizations (U.S. Call to Action on Climate, Health, and Equity: a Policy Action Agenda 2019). Often referred to as 'co-benefits' of climate action, these accompanying benefits to human health have been well-documented, though there are opportunities to better incorporate them into policy (Watts *et al* 2019, Karlsson *et al* 2020). The projects explored here demonstrate the co-benefits of several climate solutions.

The health benefits of decarbonization accrue through two distinct pathways. The first pathway between decarbonization and improved health is a pathway that requires both patience and perseverance before the benefits will be realized. By decarbonizing the world's economy, global warming can be limited, which in turn will limit the future health harms

caused by additional warming. This is the pathway illuminated in the IPCC's recent 1.5 °C report. If accompanied by large-scale efforts to draw down levels of carbon dioxide from the atmosphere, an all-out global effort to decarbonize the global economy might succeed in limiting the world's warming to 1.5 °C, which in turn would prevent a staggering amount of human lives lost. Thus, a sustained global effort to limit global warming can produce a sustained future global health benefit.

The second pathway between decarbonization and improved human health, however, requires little patience for dramatic health benefits to be realized. Decarbonization's second pathway to health benefits are experienced almost immediately, and locally, where the decarbonization occurs. As each city, state and nation makes progress in decarbonizing its own energy supplies, the air that its people breathe, and the water that its people drink becomes cleaner and less polluted, and its peoples' health immediately begins to improve (Casey *et al* 2020). Air pollution alone is one of the world's leading causes of early death and chronic illness (Cohen *et al* 2017). Moreover, the neurotoxic effects of air pollution can lead to a lifetime of harm and lost potential when the exposures occur in utero and in early childhood when the brain is most rapidly developing (Payne-Sturges *et al* 2019). Thus, a rapid transition to clean energy will reduce air and water pollution and improve human health in myriad ways (Casey *et al* 2020).

This second pathway to decarbonization is not inherently equitable, however (Fleischman and Franklin 2017, Carley and Konisky 2020). When wealthier communities are the first to make the transition, pre-existing health disparities associated with fossil fuel energy can be exacerbated (Cushing *et al* 2018). Energy burdens may also remain unaddressed or worsen if electric utilities raise energy costs during the transition, disproportionately burdening low-income households (Carley and Konisky 2020). Communities on the frontlines of fossil fuel production and combustion are directly harmed by air and water pollution and will not realize the health benefits of climate action through carbon offsets or pricing alone (Krisberg 2020; Gilbertson 2017). Prioritizing efforts to eliminate fossil fuel production and transition to clean energy in these communities is an equitable pathway to a clean energy future. Thus, if the transition to clean energy and other decarbonization measures are taken with the specific objective of increasing climate, energy and health equity, communities, nations and the world will become fairer and more equitable.

2. The importance of examining 'bright spots'

While many important unanswered questions remain about the health harms of climate change, we contend

the most important unanswered or undocumented questions are in the realm of climate solutions. Some of these include: To what degree are communities across America recognizing and rising to the challenge of creating equitable health and climate solutions? What do those solutions look like? Who has a voice in determining what solutions are implemented? How do communities come together to develop, apply and share these solutions? What can be done to encourage more communities to rise to this challenge—especially our most vulnerable communities? What resources and support do these communities need from governments, academia, and philanthropy?

Australian climate scientists Cvitanovic and Hobday (2018) recently made the case that 'Effectively translating scientific knowledge into policy and practice is essential for helping humanity navigate contemporary environmental challenges. The likelihood of achieving this can be increased through the study of bright spots—instances where science has successfully influenced policy and practice—and the sense of optimism that this can inspire (Cvitanovic and Hobday 2018).'

Over the past 2 years, we have had a unique opportunity to observe a number of health and climate solutions 'bright spots' that have emerged in the United States. This opportunity arose for us as a result of having been selected to help the Robert Wood Johnson Foundation (RWJF) create and manage a grant program focused on building the evidence-base for equitable health and climate solutions in communities across America.

The call for proposals sought projects that were improving community health and advancing health equity while also addressing climate change adaptation or mitigation. Successful projects had to have an intervention with at least a 1 year documented history of implementation activities, a history of, or deep interest in, working collaboratively with indigenous communities, communities of color, or low-income communities, and authentic engagement, representation, and leadership by members of the community. The authors of this paper were four out of a dozen people who participated in the peer-reviewed selection process, including site visits to approximately one dozen finalists. The final decisions were made by RWJF.

Here we share some of the insights we gained in this process. The first insight worthy of note is that a large number of communities across the nation have recognized the harms of climate change to the health of their people and are rising to the challenge of addressing them. Nearly 200 communities (broadly defined) from 42 states submitted grant proposals to RWJF; 25% came from rural communities, 10% from tribal and indigenous communities, and the remaining 66% from urban or suburban communities. Many more communities considered submitting proposals

but eventually refrained, likely due to the fact the applicant's program had to have been in place for at least 1 year—so that evaluation would be a meaningful exercise. That hundreds of American communities are striving to put climate science into action to develop equitable health and climate solutions is a hopeful sign.

Also worthy of note is the range of the climate and health impacts addressed by the applicants. The largest number of applications focused on multiple health harms (26%), while a substantial portion focused more narrowly on food security or quality (20%), air pollution (18%), and on access to or improvement in health care (14%). Less common but still notable foci included extreme weather or climatic events (8%), other routine weather-related problems such as averting heat stress (13%), and water quality problems (5%).

The seven projects that received funding in this grant program further illuminate the diversity of approaches.

The **Alaska Native Tribal Health Consortium** (ANTHC) developed an innovative, culturally appropriate portable water sanitation system for homes in rural, Native Alaskan communities where climate impacts on infrastructure and the environment make it nearly impossible to access safe, clean water and maintain sanitary conditions. Instead of having to haul treated water from a centralized water treatment facility or from sources of unknown quality, tribal households can filter and disinfect any source of fresh water. In addition, the system eliminates the need for residents to transport human waste back to a central facility for safe disposal—greatly reducing the risk of infections. ANTHC hopes to document how their portable water sanitation system impacts health and well-being, as well as whether this system increases household water security in culturally, economically and environmentally sustainable ways (Mitchell 2019a).

The **City of Austin**—recognizing the ways that worsening extreme heat reduces opportunities for physical activity and harms overall emotional well-being of children—is working to increase the amount of green space and tree shade around inner city public schools. Trees and other green infrastructure can combat extreme heat and the 'heat island effect' by shading people and surfaces, deflecting the sun's rays, and releasing moisture into the atmosphere. University of Texas public health researchers are evaluating the impact of this greening on the use of the outdoor spaces and on the physical activity and emotional well-being of children at three elementary schools located in low-income, predominantly Hispanic neighborhoods (Maibach 2019a).

As more frequent drought or intense rainfall and extreme heat create new challenges to farming, **Covenant Pathways** is helping Navajo farmers embrace regenerative agricultural practices to improve soil

quality and the nutrition levels of the foods they grow. In rebuilding organic soil matter and restoring soil biodiversity, regenerative farming practices also capture and store carbon, thus reversing climate change. Many of these practices are ancient but were lost with the colonization of the Americas and genocide of indigenous peoples. The Navajo Nation traditionally values guardianship of the land, including the soil, as something sacred; this project presents the promise of helping to heal their soils, their health, and their community identity. Covenant Pathways is currently evaluating the impact of these methods (Maibach 2019b).

Friends of Trees is working with the **Asian Pacific American Network of Oregon** (APANO) to plant trees in low-income, ethnically diverse neighborhoods to improve the health and well-being of local communities and reverse climate change. A core tenet of this project is that resident knowledge and expertise are fundamental. Working with APANO and other community organizations, Friends of Trees is working with residents in these neighborhoods to identify environmental health challenges and discuss how which greening solutions would best support the community. Beyond increasing tree cover, the program's volunteer model addresses another critical health issue: isolation and lack of social connections. **Portland State University** is evaluating the social and health impacts using research methods that are similarly community-oriented, building rapport and community capacity to sustain and assess future efforts (Gould 2019a).

People United for Sustainable Housing (PUSH) **Buffalo** and **Partnership for the Public Good** are helping weatherproof houses in Buffalo's low-income communities to improve energy efficiency, community development and resilience, and health while boosting the local economy. Unlike traditional energy efficiency and weatherization programs, PUSH has a number of programs to meet the unique and varied needs of low-wealth communities. In addition to the direct services they provide, PUSH is a thriving community organization where residents advocate for state policies to make housing, clean energy, and energy efficiency programs available to the people and communities in New York that need them most (Mitchell 2019b).

Regeneration Midwest and the **Organic Consumers Association** are comparing the demographics, economics, and environmental and human health in rural communities practicing regenerative farming versus those using conventional agricultural practices in six Midwestern states. Regeneration Midwest is a group of farmers, food-and-farm activists, rural community organizers, local and regional food systems practitioners, consumer advocates, and scientists who are working across 12 Midwestern states to turn new ideas around the carbon-capturing practices of regenerative farming—a range of approaches to improve soil health that include farming practices like crop

rotation—into on-the-ground and in-the-ground climate and health solutions. Their interventions are both social and biophysical, including intercropping, agrobiodiversity, along with the promotion of farmer autonomy, circular economies, integrated cooperative supply networks, and full-scale democratic participation, and re-establishing interwoven regional food systems (Maibach 2019c).

The **Swinomish Indian Tribal Community** and **University of Washington** are evaluating an augmentation of the Centers for Disease Control and Prevention's (CDC) Building Resilience Against Climate Effects (BRACE) Framework that has been recrafted based on indigenous values, understanding and practices—and renamed the iBRACE Framework. Beginning in 2007, long before most communities in the United States, the Swinomish initiated a long-term and comprehensive effort to evaluate the multiple effects of climate change on their community and develop an action plan. This included assessments of long-term impacts on transportation and vital infrastructure, natural resources and habitat, and human and environmental health. Their process was community-led and inclusive, characterized by sharing information and seeking input from tribal members, inviting members of neighboring jurisdictions to participate and creating an ongoing partnership with local climate experts (Gould 2019b).

3. Emerging insights

Each of the projects listed above is a bright spot, an instance where science is being used to inform solutions for the benefit of human society and the ecosystems on which we depend. The relevance of these specific approaches to other communities will depend on many factors, geographic and otherwise, but our analysis of these seven bright spots suggests three themes that are common to all of the projects. These themes may have broader applicability to all communities seeking to develop equitable health and climate solutions:

3.1. Rediscovery

The 'innovations' are not new technological feats of wizardry, but rather are the application of well-known and sometimes ancient practices that have often been neglected or forgotten. The power of rediscovery goes beyond the benefit of the idea itself, by reinforcing the communities' sense of self-efficacy and its confidence that the solutions will be widely understood and accepted. Covenant Pathway's stewarding a return to indigenous and regenerative agricultural methods is a strong example, as is the Regenerative Midwest project, which draws on many pre-industrial farming principles. Leaders from both of these projects predict an improved sense of identity and community cohesion from these projects.

The two green infrastructure projects also represent simple, ancient, and widely understood solutions.

3.2. Reconnection

The projects reconnect community members with each other and to the world they inhabit together, creating deeper awareness of their interdependence and breaking down silos of thought and accountability. Bringing the community into the planning and execution of the project heightens awareness that our universal desire for better health depends on the 'health' of the local environment, and that the actions of many whose job titles may not include the term 'health' have a dramatic impact on our health, nonetheless. Beyond community engagement, most of these projects view building and strengthening social connections as a major health benefit of their interventions. The Friends of Tree's community partnership structure and volunteer network are the very basis of its program, and PUSH Buffalo is a vehicle for community building and organizing as much as it is for weatherizing homes.

3.3. Respect

Far from treating communities as victims in need of charity, these projects reflect deep respect for the know-how, potential for renewal and rights of the communities on the front lines of climate change. The Swinomish Indian Tribal Community's project to 'indigenize' the CDC's climate resilience framework recognizes that the community's indigenous conceptions of health and resilience add value and relevance to the largely Euro-centric process represented in U.S. federal government's framework. The process of creating this indigenized framework was purposefully deliberate and inclusive, as were many of the other projects described above. Indeed, many of the projects took root because the solutions came from within their own community, or in other ways proved their respect for the community. Rather than propose that Alaskan Native communities relocate to areas with more water, or low-income residents of Buffalo move into subsidized housing in a new neighborhood, these projects affirm the rights of communities to live and thrive where they are, solving problems with solutions that are culturally familiar.

4. Going forward

As these three themes suggest, what makes a community a 'bright spot' seems to be as much about *how it comes together to attack the problem* as it is about the specific solutions it embraces, per se. As one environmental justice advocate told us, 'We do not see health equity as an outcome. We see it as a process.'

To support the development of equitable health and climate solutions, government agencies and philanthropic organizations should nurture that process

financially. Climate and health experts should also nurture that process, both intellectually by offering to share what they know, and emotionally by being encouraging of others who wish to lead the process. Building infrastructure and capacity for meaningful participation and leadership by low-wealth and marginalized people takes time and effort, but is wholly worth it—and success likely depends on it. Experts have important roles to play, but playing them well requires bona fide collaboration with members of impacted communities.

Great solutions often solve more than one problem. Applied well, the insights of climate science can not only help address the climate crisis, they help create healthier and more equitable communities and nations as well.

Authors' note: We first drafted this article in April 2020. The events of the past several months—including the mass protests in response to the murders of Breonna Taylor, George Floyd and many others, and the disproportionate impacts of COVID-19 on communities of color,—have again shifted the discourse on the systemic racism and environmental injustices that have consistently resulted in members of BIPOC (Black, Indigenous and people of color) communities being at the forefront of climate harms. It is now clear to more Americans than ever before that, like COVID-19 and climate change, racism is a public health crisis. We intend to use this moment to not only reflect on our own missed opportunities to more clearly confront racism and our privilege, but to redouble our efforts to support communities in creating equitable health and climate solutions. We encourage our climate and public health colleagues to do the same. As academics working on climate equity, we believe we have an opportunity to be more actively anti-racist in our work and in the literature—to constantly look inward, improve, and ensure we are plainly documenting examples of systemic racism. This work has convinced us that supporting and following the leadership of frontline communities, many of whom are already creating 'bright spots,' provides us with the most reliable path to solutions that will produce health, safety and justice for all.

Data availability statement

No new data were created or analyzed in this study.

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