Health: The Human Face of Climate Change
Perspective and Recommendations for the Next U.S. President

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Abstract

Climate change is emerging as the ultimate global health crisis. Even if it were realistic to imagine greatly accelerated progress toward immediate and decisive action, global warming already presents unprecedented and potentially catastrophic risks to health, globally, nationally and locally. Climate change affects health directly, through extreme weather events, or indirectly, as a “risk multiplier” operating through environmental and social determinants, including access to air, water, food, sanitation and health care. Climate-related health risks, which threaten to reverse decades of hard-won public health gains, will vary by geography and population. The greatest threat is to the most vulnerable – children, the elderly, the poor and the sick.

Addressing this crisis represents a high-stakes test for global leaders and for humanity, requiring expertise and effort from every field of knowledge and every sector of society. The next president must reset the climate change discussion away from a debate between believers and doubters and toward action in the face of new and uncertain threats. The health sector has a major role to play in reframing the problem. Making health a central focus of all climate change policies, programs and planning can shift attention to widely-shared concerns and values. The administration must use all its tools – appointments, directed funding, convening power and, most of all, presidential leadership – to heighten public awareness, facilitate interagency and international cooperation, engage all stakeholders, and press for urgent and effective action to anticipate and address the health risks associated with a warming planet.

We offer three recommendations:

1. **Recognizing that climate change is central to global health security, create the President’s Emergency Response to Climate Change (PERCC).** Climate change is central to national and international security in every dimension: health security as well as economic and military security. Presidential Emergency Plan for AIDS Relief (PEPFAR), placed in the State Department in 2003, saved millions of lives and led to broad health gains across affected countries. The next president should create a similar 10-year, $90-billion global initiative to meet climate change challenges to health.

   - Establish a strong global surveillance system, developing new early-warning tools, linking existing networks, making data widely available, and creating platforms to share results.
   - Invest in international research, development and demonstration to advance adaptations to climate change and deepen knowledge on the co-benefits of integrating climate science and health science.
   - Strengthen preparedness and resilience in all health systems. Current readiness is inadequate. New technical and organizational structures must integrate across fields, using networked coordination and systems thinking.
   - Evaluate and encourage development of co-benefits, investing in development of technology, products and services that reduce climate change and improve health.
   - Strengthen resilience in low- and middle-income countries through technical support, collaboration and innovative financing for efforts toward improved surveillance, mitigation and adaptation, especially in geographies already heavily affected by climate change.

2. **Invoke health to catalyze movement on climate change.** Appoint strong climate advocates in leading positions across the federal health apparatus. Invest in resilient health care systems, in “green hospital”
initiatives and in health professionals as movement builders. Position hospitals as anchors to prepare communities to withstand the shocks of climate change. Engage public on the health benefits of slowing climate change. Support action by state and local governments, emphasizing innovation and rapid response. Engage stakeholders at all levels, especially vulnerable populations.

3. **Prioritize clean energy.** Reduced reliance on fossil fuels is essential preventive medicine. Premature deaths from outdoor air pollution are set to rise from 3 to 4.5 million by 2040. Business as usual may, by century’s end, be catastrophic for human health. The U.S. should phase out coal-fired power plants in 10 years, price other fossil fuels to reflect true costs, and intensify climate change diplomacy promoting health equity around the world.

As this century unfolds, the strength of our resolve and consequences of our actions will become evident. No one who has studied these issues seriously and objectively would deny that climate change is already here and portends a global future of widespread upheaval. We face formidable obstacles in the political and economic structure of the problem and in the reality that climate disruption is inflicting the greatest suffering on those least responsible for causing it, least equipped to adapt, least able to resist the powerful forces of the status quo. Useful responses will depend on conviction and courage, sophisticated partnerships, wise policy, effective treaties, focused investment in research and development, moral discernment, imagination and compassion. If ever there was a moment in history for inspired presidential leadership, if ever there was an issue worthy of a leader’s best effort, this is the moment, this is the issue. Time is short, but it may not be too late to make all the difference.
Health: The Human Face of Climate Change

Introduction

Health is fast becoming the human face of climate change. Almost daily, news sources feature health emergencies that are linked directly or indirectly to climate: lives lost to 100-year floods in the Gulf states and raging wildfires in the western U.S.; 58,000 deaths during a heat wave in Russia; Zika-damaged babies across the Americas; severe water shortages in parts of South Asia; starving villagers in Malawi. Rarely do the media draw the connections among these events, and more rarely still do commentators connect the dots between a warming planet and a rising burden of risks to human health.

Even if the world’s people were poised to take immediate, decisive action to reduce greenhouse gas emissions and implement existing plans for adapting to the inevitable changes already under way, climate change would still portend unprecedented risks to health – globally, nationally and locally. If we fail to act now, the survival of our species may hang in the balance. Scientists are openly discussing this grim prognosis as the window for action narrows with the passage of days, weeks . . . years. If ever there were an issue awaiting presidential leadership, this is it: an economic issue, to be sure, and increasingly a security issue, but also an existential threat that must somehow be raised above the politics of the moment and our propensity to deny and distract ourselves from looming threats we fear.

Our purpose for writing this paper is to offer the health perspective as an essential frame for comprehending the stakes in climate change and for mobilizing Americans to see ways they can meaningfully act in their own interests and those of their families and communities. In it we draw from published literature on the complex relationship between climate change and health; make a case for moving health to the center of climate change policy, diplomacy and communication; and propose and support three high-level recommendations for the next administration:

1. Create the President’s Emergency Response to Climate Change (PERCC).
2. Invoke health to catalyze movement on climate change.
3. Prioritize clean energy as essential preventive medicine.

The climate crisis represents a singular test for global governance and leadership. The challenge is philosophical, technical, moral and systemic. It demands collective action and decision-making under uncertainty and will require expertise and effort from every field of knowledge and every sector of society, at every level of human organization.

While climate change is an urgent crisis, it is not amenable to quick solutions. The next president must catalyze and lead a broad and enduring global movement to create an equitable, secure and sustainable future for Americans, for all citizens of the world, and especially for future generations.
Background

Humans have been adapting to environmental change for millennia, surviving ice ages, droughts and plagues. Over some 12,000 years of the Holocene epoch, the levels of climate-warming carbon dioxide in the atmosphere remained relatively stable, as did Earth’s temperature. But as the industrial revolution in the 20th century accelerated growth in population, economic activity, technology and pollution, human activities began to alter the planet’s life-support systems. The scale and permanence of those impacts are such that geologists are now dating a new epoch to around 1950, calling it the Anthropocene to signify that Homo sapiens have pushed the Earth’s natural systems into disequilibrium, moving greenhouse gas accumulations beyond levels considered safe for humanity’s biologic and social well-being.¹

The question of specific adaptations that could protect humans and their health against the effects of climate change is becoming a major theme among specialists in public and population health, as well as some other physicians and health care administrators.² Scientists in other fields, however, and the general public have for the most part focused more on environmental and ecological aspects of climate change and technological questions than on human and health implications.³ Yet those studying climate change and health are already seeing evidence of damage to human health (for example, in rising rates of allergies, respiratory, and vector-borne diseases) and are calling for fuller study and better quantification of such impacts and their direct and indirect causes.

Climate change affects health in several ways:

- **Directly:** Extreme weather events, including flooding, fire, drought and heat waves, can cause trauma, death and ongoing health and mental health effects.
- **Indirectly through environmental and ecological pathways:** Damage to ecosystems may reduce crop yields; increase sea levels and salinity; shift patterns of disease through new distributions of ticks, mosquitoes and other vectors; and transmit water- and food-borne disease as pathogens respond to variations in temperature and precipitation.
- **Indirectly through socially-mediated effects:** Economic, social, cultural and political factors can amplify the burdens of climate change. Vulnerable populations are the first to suffer from food insecurity, water scarcity, extreme weather, excessive heat and the physical and mental stresses that follow: undernutrition, violence, displacement, economic losses and the destruction of protective infrastructures.

The current scientific consensus on the health effects of changes in global environmental systems has been summarized in a number of expert reports that are comprehensive, easily accessible and reader friendly. Five in particular stand out.

- **A Human Health Perspective on Climate Change**, published in April 2010 by the National Institute of Environmental Health Sciences (NIEHS), summarizes “research needs for all aspects of the research-to-decision making pathway that will help us understand and mitigate the health effects of climate change as

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well as ensure that we choose the healthiest and most efficient approaches to climate change adaptation.”

The report explores 11 specific disease and exposure categories, summarizing current knowledge and highlighting research needs. It concludes with this observation:

Natural systems adapt to environmental changes or they fail. Climate change threatens many of the natural and built systems that protect and preserve our nation’s health [including] hospitals, clinics, public health agencies, trained personnel, roads and transportation systems, the electrical grid, water treatment systems, and many other components [and the] intangible organizational structures (human and social capital) … required to maintain resilience to environmental threats. Climate change could have grave impacts on public health systems if they are not appropriately strengthened. Research into the vulnerability of these systems will be critical. . . . We have the capacity to avoid many of the worst health effects . . . and an ethical imperative to do so.

- “Human Health: Impacts, Adaptation, and Co-Benefits,” a chapter in the 2014 Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), extensively documents observed and expected health risks. The report highlights the vulnerability of cities: By 2050, it projects that the number of urban dwellers facing chronic water shortages will rise from 150 million to 1 billion. The panel argues that policymakers should prioritize rapid development: “If economic growth does not benefit the poor, the health effects of climate change will be exacerbated.” The most effective means to increase resilience are reduced poverty, basic health care, access to clean water and sanitation, and improved capacity for disaster preparedness and response, it finds. The panel recommends looking closely at “scientific evaluation of the health implications of adaptation measures at community and national levels [in order to] improve understanding of the extent to which taking health co-benefits into account can offset the costs of greenhouse gas mitigation strategies.”

- The Third National Climate Assessment (NCA), issued in 2014 by the U.S. Global Change Research Program (USGCRP), a joint program of 13 U.S. agencies and departments, describes “wide-ranging health impacts,” some of which are “already under way in the United States,” and argues that “public health actions, especially preparedness and prevention, can do much to protect people from some of the impacts…. Early action provides the largest health benefits. As threats increase, our ability to adapt to future changes may be limited.”

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4 C. J. Portier et al., A Human Health Perspective on Climate Change: A Report Outlining the Research Needs on the Human Health Effects of Climate Change (Research Triangle Park, NC: Environmental Health Perspectives/National Institute of Environmental Health Sciences, 2010).

5 Ibid.


7 Ibid.

8 Ibid.

The Lancet Commission on Health and Climate Change published a 2015 report reiterating its 2009 conclusion that “climate change is the biggest global health threat of the 21st century.”\(^{10}\) It cites "rigorous epidemiological research" attributing an estimated 400,000 excess deaths to climate change in 2010, “with a significant increase in this figure expected by 2030.” Climate change acts as “a ‘force multiplier,’ exacerbating many of the world's global health challenges,” the Commission states, recommending “urgent and sustained emissions reductions, as well as effective adaptation . . . to reduce these impacts.”\(^{11}\)

The Commission presents 10 policy recommendations for government, several related to increased investment in research, monitoring, surveillance and to “quantification of avoided burden of disease, reduced health-care costs, and enhanced economic productivity associated with climate change mitigation.”\(^{12}\) Others recommend health-promoting energy policy and urban design and new “mechanisms to facilitate collaboration … empower health professionals, and ensure that health and climate considerations are thoroughly integrated into government-wide strategies.”\(^{13}\) Finally, the Commission establishes an international “Countdown to 2030” panel to monitor progress.\(^{14}\)

The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment (USGCRP, 2016) extends the NCA’s 2014 assessment of concerns about human health.\(^{15}\) It synthesizes published data in a series of chapters, each focusing on a particular climate driver. The report characterizes the strength of scientific evidence along each pathway, notes improved “scientific confidence in the climate change and health link,” recognizes “populations of concern,” and identifies emerging issues.\(^{16}\) "Every American is vulnerable to the health impacts associated with climate change," the report states.\(^{17}\)

Taken together, these reports align with a number of other published sources in their emphasis on a set of priorities that need to be pursued aggressively and concurrently. Scientific understanding of the climate change/health nexus needs to be deepened, and evidence-based decision-making augmented at the same time that adaptation plans are being developed and disseminated to manage uncertainty and risk. What has been lacking to date is adequate funding and support for moving such a complex agenda forward at a reasonable pace.

First, it is widely agreed that advancing the science will require better tracking of data on multiple levels and linking of environmental conditions to health risks and outcomes. Data from disparate sources (clinical, meteorological, ecological, biological, economic), collected at different scales and using different methods, needs to be better integrated. Further, there is an urgent need for enhanced analytic capacity, including modeling and forecasting health risks related to climate change and quantifying the potential to reduce disease and health care costs through timely and effective adaptation. This, in turn, points to the need for systematic development and testing of alternative strategies to reduce risk.


\(^{11}\) Ibid.

\(^{12}\) Ibid.

\(^{13}\) Ibid.

\(^{14}\) Ibid.


\(^{16}\) Ibid.

\(^{17}\) Ibid.
All of this requires multilevel, interdisciplinary, integrated approaches that operate, in terms of governance, both from the bottom up and the top down, recognizing that it is generally at the local and state levels (where resources are often strained) that threats and vulnerable populations can best be identified and reached, adaptation strategies designed and tested, and emergency responses activated. Local health departments are the first line of defense, and they are grievously underfunded and understaffed. The hospital sector has a significant and as-yet underdeveloped role to play. Robust partnerships are essential, as are new collaborations across a wide range of disciplines, jurisdictions and domains within and across agencies of government; the private sector; community, religious and faith-based organizations; universities; nonprofits; and the health and public health infrastructure.

Second, a high priority should be to identify locations and populations that are in harm’s way and the specific threats they face. Displaced populations are particularly vulnerable, and water and food security are fundamental to human health. Strategies for community development and for adaptation of the built environment, the transportation systems and the public health infrastructure are also important. Response plans need to envisage specific exposures and needs. Mental health consequences of extreme weather events can be severe and need to be anticipated: anxiety, depression, grief, trauma and the losses and stresses of mass displacement and regional conflicts.

Third, it is widely agreed that new resources are needed for capacity and workforce development, for enhancement of the resilience of the public health and health care infrastructures, and for dissemination of a new set of cross-disciplinary competencies across the research and service-delivery sectors of the health and public health systems.

Fourth, it is generally acknowledged that communication and risk communication need to be enhanced, targeted, refined and tested to strengthen public appreciation of individual and community risks, to encourage preparedness and to galvanize support for the kinds of public investments that are needed to fortify the nation’s defenses against climate change.

Finally, a persistent theme in the literature is the need for new ways of collaborating: faster, more flexible, with more and new partners, and often with transient structures focused sharply on specific problems. A top-down approach is not flexible or agile enough. The imaginations and experiences of people and communities at every level are needed, and, to accomplish this, researchers and other professionals will have to reach beyond traditional partners and cross into unfamiliar territory.

For this, there may be models to follow. Global networks of research, development and demonstration (RD&D) increasingly exist in the private sector, and often in government and civil society as well. While 30 years ago, talent, resources, expertise and experience seemed to be clustered in a few hundred institutions, primarily in North America and Europe, today’s researchers, policymakers and activists can tap into a dense network of working relationships among individuals and institutions located in a far more diverse set of entities around the world. “Multinational corporations, governments, and civic institutions operate global RD&D enterprises relying on both in-house and outside (sourced) talent and intellectual property, organizing these efforts around an applied research mission, market opportunity, or civic need,” notes Bruce Guile in a working paper.18 As an example, the Defense Advanced Research Projects Agency (DARPA)....

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recruits exceptional leaders from government, academia and industry for three-to-five-year cycles, in order to press for transformational, rather than incremental, change. At the recommendation of a panel of the National Academies of Science, the DARPA model has been adopted by the Advanced Research Project Agency–Energy (ARPA-E) and could be deployed to address health impacts of climate change.

The world's increasing interconnectedness can be leveraged not only to advance RD&D, but perhaps also to drive public engagement in fighting climate change. Environmental communication (and the subfield of climate change communication) has matured over the past 30 years, along with the fields of health promotion and social marketing, all of which conduct experiments to identify effective strategies to improve knowledge, reshape attitudes and influence behavior – all in the service of communicating risks, and protecting and advancing the public's health. Social media add another dimension – accessible and interactive, opening multiple avenues of approach and offering opportunities to learn from instant feedback. Critics have raised concerns, on the other hand, that ever more pervasive and invasive technology-based communication media have created information overload, polarization, privacy concerns, escapism and social isolation, all of which may undermine the goal of arousing appropriate concern about impending threats. Here, too, more research is needed with an eye toward communication approaches that emphasize compassion and support, respect, and restoration of connection. Moser sees a pressing need for what she calls a "humanistic turn in environmental communication." The world is increasingly complex.

And yet, paradoxically, these times of great uncertainty and unprecedented environmental and social challenge may open extraordinary opportunities for the next president of the United States to put a human face on climate change, harmonize the many voices across the nation's landscape and mobilize the can-do spirit that makes this country great. We offer three recommendations, all building on the dual premise that (a) the health sector has a major role to play in reframing the problem of climate change and (b) making health a central focus of all climate change policies, programs and planning can shift attention to concerns and values the American public deeply holds and broadly shares.

Our three recommendations are grounded in seven basic operating principles:

1. Align with promising efforts already in place rather than creating new institutions that are redundant and dilutive.

2. Adapt successes from the past to inform new efforts and needs (PEPFAR and DARPA are two examples).

3. Reward cross-cutting collaborations and new ways of thinking and working.

4. Reach beyond traditional actors to engage at every level and through every channel.

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5. Keep climate change front and center, with health concerns as a primary motivator and health professionals and institutions as ubiquitous sources of influence and stability.

6. Vigorously pursue mitigation strategies to slow and eventually reverse global warming trends, while advancing knowledge and preparations to meet and manage impending risks.

7. Emphasize that U.S. policy on climate change should be consistently global, focusing on helping low- and middle-income nations leapfrog into a clean energy future and close gaps in health equity climate change threatens to widen.

RECOMMENDATION #1

Recognizing that climate change is central to global health security, create the President’s Emergency Response to Climate Change (PERCC), locating this initiative in the U.S. State Department to global health security and diplomacy and to enable U.S. agencies and other partners to advance adaptation and mitigation through the lens of health.

Established in 2003, PEPFAR is the largest and longest commitment by any nation to address a single disease and remains the flagship for HIV response around the world. PEPFAR has supported more than 9.5 million people on antiretroviral treatment, saved 1.1 million lives, and lowered sub-Saharan African mortality by 10 percent. In addition, it strengthened health systems and led to broad health gains in affected countries. Over 10 years, the United States invested $63 million dollars, and PEPFAR remains the cornerstone of the Presidential Global Health Initiative. Government agencies and academic institutions have used PEPFAR funds to study and treat HIV with remarkable health outcomes.

We suggest a similar 10-year, $90-billion fund to meet climate-related health challenges. Climate change is central to national and international security in every dimension: health security as well as economic and military security. The surest long-term strategy to fight transnational threats is to promote global health and stability. As with HIV, climate-related health impacts will not respect borders. Moreover, health security can easily spill over into other dimensions of national security, triggering military, economic, social and political concerns. We therefore propose the PERCC as a means to better characterize and respond to these new threats, both at home and abroad. Our model is based on the PEPFAR example.

Specifically, PERCC can help:

- **Establish a strong global surveillance system**, developing new early-warning tools and building on existing networks. Better surveillance of food- and water-borne diseases, vector transmigration, and deaths, injuries and disease sequelae of extreme weather can help decision-makers at all levels of

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government and civil society predict and prepare for adverse climate-related health outcomes. In addition, such systems should incorporate information from nonhealth sources: Linking meteorological, agricultural and other “big data” sources could, for instance, enable predictive modeling and preventative health measures. Data should be made widely available, and new platforms developed to share results.

- **Invest in research, development and demonstration (RD&D) to advance adaptation** to climate change and deepen knowledge about the co-benefits of integrating climate science and health science. Currently, few medical, nursing and public health schools have strong climate and health divisions, and few climate scientists are well-informed on health impacts. Limited grants are awarded by the NIEHS or the Centers for Disease Control (CDC) to advance the science of climate’s impact on health or methods of mitigation and adaptation through the lens of health. More funding is urgently needed to solidify this emerging cross-disciplinary field.

- **Strengthen preparedness in all health systems** by integrating across fields using networked coordination and systems thinking. PERCC funding can facilitate vulnerability mapping, enhance planning for food and water security, and encourage innovation by states and counties to modernize, strengthen, and streamline public health services and infrastructure. It can target areas of vulnerability, such as public and private water systems. PERCC support may also create incentives for the private sector to rapidly prototype and bring to market new products, services and collaborations that enhance adaptation to climate change impacts.

- **Evaluate and encourage leveraging of co-benefits**, investing in technology, products and services that reduce climate change and improve health. For example, grants could showcase urban planning that supports healthy lifestyles, energy-efficient building, low-cost public transportation and open spaces, thereby reducing urban pollution and rates of cardiovascular disease, asthma, pulmonary disease, obesity, diabetes and mental health disturbances.

- **Strengthen resilience in low- and middle-income countries (LMICs)** by funding efforts toward food and water security, and improved surveillance of changing vector distribution, zoonoses, and emerging infectious diseases. Strengthening LMIC capabilities to monitor and respond to disease outbreaks protects the health of U.S. citizens as well as the world’s, as diseases respect no boundaries. To achieve resilience, LMICs must prioritize investment in health and health systems, as well as build capacity to monitor climate change and adapt to impacts. The U.S., through PERCC, can partner with them, offering technical support, collaboration and innovative financing, especially in geographies already oppressed by climate-related damage to ecological and life-support systems.

We suggest PERCC reside in the U.S. State Department, as PEPFAR did, to highlight the need for climate diplomacy and security. Multiple U.S. agencies should be eligible to apply for funding, and PERCC should encourage multilateral engagement of international funds and country partners to strengthen U.S. investments.

When HIV emerged in Africa, it became clear that the world and not just a continent was threatened by this devastating disease. The U.S. stepped up to protect those vulnerable populations least resourced to protect themselves. Led by a bold executive decision by President George W. Bush, the United States made an extraordinary commitment to spur global as well as U.S. initiatives for research and treatment to counter AIDS. President Obama honored and extended that American commitment to stem a world crisis.

As HIV did, climate change presents unprecedented risks to public health – globally, nationally and locally – and likewise disproportionately threatens vulnerable populations. PERCC could have a similar catalytic
impact by underwriting global RD&D applied to the political, economic, medical and social context of climate change. PEPFAR dramatically changed the path of AIDS. PERCC can funnel similar energy and attention to the potentially cataclysmic course of climate change.

RECOMMENDATION #2

Invoke health to catalyze movement on climate change.

Our second recommendation directs the attention of the next administration to a potentially powerful resource for progress in sustainability: the nation’s health sector, together with the public’s interest in personal health. This recommendation envisages government support of networked and distributed health care leadership pursuing three major imperatives: (a) studying and improving the resilience and readiness of the health care delivery system as an essential community resource in times of crisis; (b) advancing the drive toward sustainability and renewable energy in the health sector itself, and (c) planning for a healthier future.

Activating these resources will require attention to a fourth, and deeper, imperative, namely the selection of leaders across all federal health agencies who understand the urgency of climate change, the inadequacy of existing scientific evidence to support preparedness and adaptation, and the critical need for investment in predictive modeling and robust evidence for decision support.

In his 2013 Comprehensive Climate Action Plan for the United States, President Obama charged the Department of Health and Human Services (DHHS) to “ensure that the medical system is resilient to climate impacts” and that public health professionals and community leaders are preparing their communities “for the health consequences of climate change.”

A number of federal agencies, notably the NIEHS and the CDC, have begun developing leadership models at multiple levels of governance (federal, state, regional, municipal, community) to advance the movement against environmental degradation and global warming. We believe the health care sector – at home and abroad, public and private – can play a critical role in accelerating the momentum to address climate change.

Some of this work involves public-private partnerships with university-based and free-standing organizations. An example is Health Care Without Harm (HCWH), founded in 1996 as a grassroots coalition. HCWH has driven interventions with documented success and has evolved a vision of a health care sector positioned to play a pivotal role in “healing, or restoring, ecological, economic and social capital” in communities served by hospitals and large health care conglomerates, here and around the world.

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The Healthcare Delivery System: Resilience and Readiness

The first imperative, articulated by DHHS, is “to assure the continuity and quality of health and human care before, during and after extreme weather events.”27 Events like Hurricane Katrina and superstorm Sandy broadcast the special vulnerabilities of underserved populations and the inability of existing health care organizations to rally to their aid. The resilience of the entire health care system needs to be re-thought – ground up, top down, and across the interstices – asking questions well beyond emergency planning as traditionally understood.

Healthcare executives will need sensing systems that are local, fine-grained and geographically specific. For example, NIEHS developed in collaboration with HCWH a “toolkit,” which has been piloted in 10 major health care systems and is ready for wider dissemination.28 The next administration could bring to every U.S. hospital these tested tools, training methods and strategies. This would also strengthen hospitals’ community needs assessments, mandated by the Affordable Care Act, and should be designed to help document and quantify the immediate health benefits achievable through successful actions to reduce the impacts of climate change.

Sustainability and Renewable Energy in the Health Sector

The second imperative is the “greening” of the health care industry itself, a $3-trillion economic enterprise, 18 percent of the U.S. economy. In some 200 American cities, the hospital is the primary economic engine and sociocultural pillar of the community.29 Health facilities produce an estimated 8 percent of U.S. greenhouse gas emissions, 12 percent of acid rain, 10 percent of smog and 9 percent of respiratory disease-causing pollutants, accounting annually for an estimated 470,000 disability-adjusted life years (years lost from illness, disability or early death).30

National and international coalitions are pressing forward the work of identifying and eliminating known health hazards embedded in hospital operations. Hospitals are beginning to face, measure and address their damaging impacts and document the results. An example is the private Gundersen Health System in Lacrosse, Wisconsin, whose investment of $2 million in sustainability improvements in 2008–2009 now produces more than $3 million in annual savings, money they reinvest in further innovation.31 Conservation can be demonstrably profitable.

The next administration could take a page from the private sector and work out methods to finance cycles of innovation through savings accrued from squeezing out waste. It could establish a revolving capital fund enabling hospital systems to innovate and then pay back as they achieve savings from meeting...

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27 “The President's Climate Action Plan.”
29 D. Zuckerman et al., Hospitals Building Healthier Communities: Embracing The Anchor Mission, (Takoma Park: The Democracy Collaborative at the University of Maryland, Takoma Park, 2013).
sustainability goals. Project designs should be required to capture and disseminate what has been learned about key vulnerabilities and successful strategies to increase resilience.

**Messaging for a Healthier Future**

The third imperative is to bring sustainability into the mainstream of public health education, communication and promotion. For years the world’s scientists labored to rally the public around the threat of climate change. A decade ago the Center for Climate Change Communication at George Mason University began to study “framings” that might break through the public’s resistance. In scores of studies dissecting gaps in understanding the realities of climate change, the Center consistently found that the connection between climate and health is invisible to the average American. And yet messages about personal health resonate deeply with the public. In fact, even those most deeply skeptical of the climate message, the Center’s studies reveal, can support cleaning up the atmosphere for “the better life” this would bring family and friends who suffer from respiratory and other ailments. “Just don’t try to sell it to me on climate change,” they say in focus groups. “That’s a hoax.”

The Center has been reaching out to the medical and health communities with materials and advice that draw on this research foundation and reframe the climate message in terms of personal goals for health and well-being that Americans understand and value.

The next administration could encourage and support this work by the health care and public health professions, already poised to roll out a nationwide communications plan. Health professionals can reframe climate change as a public and personal health issue, thus activating support for essential climate change policies that are politically stalled, such as pricing carbon, eliminating coal, supporting the EPA’s Clean Power Plan, enforcing renewable energy standards and releasing research funds. As trusted members of society, doctors and nurses can convey the necessity of moving away from fossil fuels for the sake of healthy communities, a healthy planet and the well-being of future generations.

To bolster such messages, the administration, through both its health research arms (CDC and NIH) as well as other relevant agencies including EPA and NOAA, should stimulate vital research on specific impacts of climate change on health and on achievable gains that can be realized, both immediately and in the longer term, through timely mitigation and adaptation measures.

Some of the imputed savings could be reinvested in preventive programs, especially those that arouse public awareness of the interplay between personal and planetary health. An ambitious sustainability perspective on public health would analyze and quantify a whole range of structural, economic and social factors that affect the health of populations and of the planet: aspects of urban planning and transportation, agricultural and fossil fuel subsidies, and regulation of chemicals and pharmaceuticals, for instance. The ultimate goal would be to identify targets of opportunity to improve the nation’s health through evidence-based environmental policy.

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33 Ibid.
New Leadership for New Challenges

Beyond these three specific imperatives lies a fourth, more immediate, one. The current reality is that the federal health apparatus is far from adequately staffed, funded or mobilized to meet the magnitude of the coming challenges associated with climate change. Leadership at the highest levels, delegated directly from the Secretary of Health and Human Services, is needed to communicate consistently that preparedness for climate change is fundamental to all aspects of the federal health mission. And Cabinet-level understandings are needed to penetrate firewalls between existing jurisdictions, so that research capacity and funding will be directed toward advancing regional climate science and expertise that crosses agency boundaries. Thus, the preeminent imperative facing the next administration in the short term is to appoint strong climate advocates in leading positions across the federal health infrastructure.

RECOMMENDATION #3

Prioritize clean energy as essential preventive medicine.

Transitioning to clean energy sources – not just in the U.S. but globally – is the essence of preventive medicine. Business as usual could, by century’s end, be catastrophic for human health and civilized society.

If global warming continues on its current trajectory, the world – even with current pledges for cutting greenhouse gas emissions – is on path to temperature increases of 4 degrees C, a level associated with cataclysmic change: extreme heat waves, widespread and intense shortages of food and water, inundated cities, devastating storms and large-scale displacements of people.34 Turn Down the Heat, a 2016 World Bank report prepared by the Potsdam Institute for Climate Impact Research (PIK) and Climate Analytics, notes that the Earth’s life-support systems do not respond to climate change in a linear way. “If we venture far beyond the 2°C guardrail, towards the 4°C line, the risk of crossing tipping points rises sharply,” notes PIK Director H. Joachim Schellnhuber. “The only way to avoid this is to break the business-as-usual pattern of production and consumption.”35

As World Bank Group president Jim Yong Kim has said, “Lack of action on climate change threatens to make the world our children inherit a completely different world than we are living in today.”36

To avoid this outcome and its almost unimaginable consequences, the United States must move beyond short-term thinking and partisanship to take decisive action. A rapid transition to clean energy sources will be disruptive and painful, much more so in some communities, regions and countries than others. The next administration will have to use its convening power to engage stakeholders on all sides of the issue and navigate a path forward.

The innovator’s dilemma, described by Harvard Business School professor Clayton Christensen, notes that in times of complexity and rapid change, companies often fail to recognize that they will have to choose between adapting incrementally to better serve existing clients and markets or risking disruptive actions to

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34 Ibid.
open new markets and opportunities for future growth. The next administration should take a hard look at how this thinking might apply to energy use: If federal goals and efforts remain oriented toward incremental progress, for which it is easier to build consensus, then will it be possible to achieve the transformative change demanded by the scientific consensus on climate change?

We suggest three elements of a solution, none easy but each important.

**Phase Out Coal**

The United States should commit to meet the United Kingdom’s ambitious goal of phasing out coal-fired power plants within 10 years. If all the coal-fired power plants currently planned or under construction are deployed over their expected lifetimes, the additional greenhouse gases will substantially increase levels of global warming. Already, coal is associated with four of five leading causes of death in the U.S. The World Health Organization estimates deaths from air pollution at about 7 million globally and identifies such pollution as the leading cause of mortality in some countries.

Reducing coal use offers compensating co-benefits in improving health and mitigating global warming. Quantifying those health and climate gains more accurately can help make the case for change and is a promising target for research. Investments in clean coal technology, while achieving some success, will not win the race against climate change. Federal policy needs to address the serious economic and social challenges that many communities dependent on older energy technologies will face as renewable sources develop.

**Price Other Fossil Fuels to Reflect True Costs**

It is important to recognize that policies developed over decades favor use of fossil fuels and fail to account for costs to health and climate that accompany their use. The U.S. should move away from support of fossil fuels through subsidies, public finance and other instruments, and direct such monies toward sustainable energy sources.

Prices of carbon-based fuel sources should reflect true costs, including environmental and health damages, now and for future generations. The U.S. can advance this effort by further implementing carbon pricing schemes, along with 40 national jurisdictions and more than 20 cities, states and regions. In addition, it can encourage development of national and international emissions trading markets. As part of this effort, the U.S. can implement the inclusion of natural capital in assessments of energy, infrastructure and other development projects, incentivizing energy efficiency, active transport, “green” building methods, and greater reliance on sustainable energy. Many of these policies offer co-benefits for health and climate.

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37 Ibid.
Intensify Climate Change Diplomacy

As a nation that led in industrialization and has reaped the economic, social and political benefits of development over many decades, the United States has a moral obligation to lead in mitigating and adapting to the human-induced changes to the environment. The next administration should approach this challenge with some humility, reflecting the nation’s role in creating the problem and in continuing relatively high levels of energy consumption, yet also with a willingness to use the United States’ political and financial capital to advance climate change diplomacy.

Actively promoting and implementing ambitious measures for mitigation and adaptations to climate change diplomacy is not just a moral obligation, however. It is also essential for global peace and security. The geopolitical and socioeconomic consequences of climate change will need to be addressed, now and even more so in the future. The next administration will have to keep climate change and its health impacts in prominent view as it engages internationally with other governments, civil society and the commercial sector around issues of environment, development, global health and trade. Climate change diplomacy can build strong relationships, defuse tensions and misunderstandings, foster cooperation around RD&D, and promote dialogue and understanding as the nations of the world move toward an uncertain future.

Conclusion

While climate change has entered mainstream thinking – in a March 2016 Gallop poll nearly two-thirds of Americans expressed a “great deal” or a “fair amount” of worry about global warming – few understand the implications for human health. This paper highlights the work of scholars and activists who have underscored health as an essential frame for comprehending the stakes in climate change and for encouraging Americans to grasp that it is within their power to advocate, collaborate and take actions that will protect their own health and that of their families, neighbors and communities. Writer and speaker Kathleen Dean Moore is invariably asked by audiences, “What can one person do?” “Stop being one person,” she replies.

The climate crisis is a collective action problem that no single sector can solve alone. It presents a singular test, we believe, not only to global governance and leadership, most especially that of the next president of the United States whose wise action will be indispensable, but also to democracy, to cities, counties, states, and ordinary citizens of this and every nation. In our review of the literature, we find much we all might fear. But in it we find, as well, a measure of mature hope, the kind that is activated and amplified by a resolution to act. We offer these few recommendations in the hope that they may be of some service in the ongoing effort to arouse and orchestrate a worthy response to the formidable challenge of climate change, a response that may in time actualize the hope of an equitable, secure and sustainable future for Americans, for all citizens of the world and for generations to come.

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