

December 13, 2021

David Meyers, M.D.
Acting Director
Agency for Healthcare Research and Quality
Department of Health and Human Services
5600 Fishers Lane
Rockville, MD 20857

Re: Request for Information: AHRQ's Role in Climate Change and Environmental Justice, Docket (AHRQ_FRDOC_0001-0888)

Dear Dr. Meyers:

Health Care Without Harm and the health and medical organizations signed onto this letter appreciate the opportunity to provide comments on how the Agency for Healthcare Research and Quality (AHRQ) may have the greatest impact in addressing climate change through its core competencies of health systems research, practice improvement, and data & analytics.

Our organizations represent hospitals and health care systems, physicians, nurses, and health and public health professionals. We have dedicated our lives to improving the health of our patients and communities. We are now watching the health impacts of climate change accelerate rapidly here and around the world, with increasing illness and deaths from extreme heat, wildfire smoke, and flooding. The proof that climate change is a health emergency is playing out right now throughout the health care system and in communities across the nation.

Climate change is also a threat multiplier for all other social determinants of health. For example, people living with limited economic resources in areas with deteriorating infrastructure are more vulnerable to climate-related health effects and are less able to recover following extreme weather events or wildfires.

Fueled by climate change, extreme weather events are occurring more frequently, heatwaves are becoming more relentless, and wildfire season has become deadlier, longer, and more destructive. Climate and health disasters leave health care facilities vulnerable to suspended services, postponed procedures, evacuation orders, an inability to treat patients, and closure. Nationwide, the combination of public health crises and extreme weather events have strained hospital facilities, stressed staff, and depleted resources. Extreme weather and climate-related disasters have been especially devastating in 2020 and 2021.¹ By September 2021, one in five intensive care units in the U.S. were at or near capacity, driven largely by another surge in COVID-19 infections, and then stretched to the limit by heat-related illness, wildfires, flooding, and other climate-related emergencies.

The impacts of extreme weather on health care facilities and public infrastructure can have devastating effects on community health in the short and long term. When infrastructure failures cause hospitals to close in communities where they are anchor institutions, jobs and the local benefits associated with the

¹ According to NOAA, 2020 was a record-breaking year for costly disasters nationwide. Twenty-two billion-dollar weather and climate related disasters wreaked havoc on communities across the country, totaling \$95 billion in damages. As of October 2021, the United States had experienced 18 weather/climate disaster events with losses exceeding \$1 billion each, resulting in 538 deaths and significant economic effects on the areas impacted. The annual average for billion-dollar disasters for the most recent 5 years (2016–2020) is 16.2 events compared with an annual average of 7.1 events for 1980–2020. <https://www.ncdc.noaa.gov/billions/>

hospital's procurement of goods and services are lost; access to care is reduced, which can contribute to increased disparity in health outcomes; and population can shrink as people relocate. These impacts are especially acute in rural communities, low-income communities, and communities of color and can exacerbate health risks and worsen health and resource inequality disproportionately incurred by low-income residents and communities of color.

The U.S. Department of Health and Human Services (HHS) has a critical role to play in tackling the climate emergency we are facing. The following are actions that AHRQ specifically can undertake to carry out its responsibility to use its resources to help build the healthcare system's resilience to climate threats, reduce the healthcare industry's contribution to climate change while increasing sustainability, and address environmental justice issues in healthcare.²

Advancing knowledge on how to protect human health from climate change, equitably.

- Build evidence regarding a) current and future impacts of climate change on health; b) effective and cost-effective strategies for equitable health adaptation to climate change; c) climate change mitigation strategies that will best protect health and equity; d) strategies and methods for a net-zero, climate-ready health care system; and e) methods of health-based climate change communication.

Building health-based climate adaptation and resilience.

- Examine how the nation's public health and health care systems can better anticipate health hazards related to climate change in their localities, where Americans directly experience the impacts of climate change, implement protective actions (public health adaptation), and build equitable, healthy, and resilient communities.

Advancing health equity and climate justice.

- Help empower climate-vulnerable, Black, Indigenous, and people of color (BIPOC), and frontline communities to protect themselves from climate impacts, by supporting full and meaningful participation of these communities in policy-making and decisions associated with climate change adaptation and mitigation. This includes collecting, analyzing, and sharing data to provide the basis for characterizing inequities and disproportionate impact. AHRQ should also consider the implications on communities impacted by the transition to clean energy, such as loss of employment by coal-mining and oil and gas refinery workers.

Achieving a climate-ready, low-carbon-footprint health system.

- Explore how to reduce health care demand through disease prevention, improved care coordination, and reduced waste in health care delivery. Identify strategies to advance climate readiness and resilience in the health care system, to reduce the carbon footprint of clinical services, the supply chain, and research, and to incentivize providers to adopt those strategies.

Building a health workforce capable of understanding and responding to climate change and health.

- Assure that the nation has a robust pipeline of clinicians, researchers, and public health professionals trained to protect and promote health in the context of climate change—filling

² See [Climate Change, Health and Equity at the Department of Health and Human Services](#).

roles from research to clinical care to health system adaptation and mitigation to disaster preparedness and response.

Below are more detailed answers to the broad questions posed by the Agency on why climate change is a large and growing threat to public health and the ability of the U.S. healthcare system to provide high quality, equitable care.

1. What should AHRQ's role be at the intersection of climate change, healthcare, and environmental justice to maximize the agency's impact?

Climate change touches all areas of healthcare and AHRQ is well positioned to integrate and embed climate change in each of their areas of healthcare research:

- Quality Improvement and Patient Safety
 - Health care is responsible for [8.5% of all U.S. greenhouse gas emission](#) and 388,000 DALYs from pollution-related disease (especially from particulate matter). This is similar in magnitude to the 44,000-98,000 deaths due to medical errors found by the [Institute of Medicine in 2000](#).
 - Health care quality improvement research and initiatives must include the impact of climate change and the carbon footprint of health care operations on overall quality of care.
 - Health care facilities and communities must build resilience and be prepared for climate-caused extreme events in order to ensure patient safety and access to health care services.
 - Hospital infrastructure must become climate-ready to withstand climate-caused weather events and protect patient safety to the greatest extent possible, including evacuation planning.
 - The social cost of carbon should be integrated into the Triple Aim equation as it affects both value and costs of care.
 - Hospitals are huge energy users, with a disproportionate amount of energy spent on strict hospital ventilation requirements. However, [a 2019 study](#) of these requirements found that 73.5% of the standards have no proven evidence of any patient safety benefit. AHRQ should build upon this research to determine evidence and outcome based standards for hospital ventilation, which will increase patient safety while removing a large barrier to improved hospital energy efficiency.
- Outcomes and effectiveness of care
 - Climate change is a threat-multiplier of every social determinant of health. The health impacts of climate-caused events are disproportionate in low-income communities, communities of color, children, the elderly, and the medically vulnerable.
 - Communities, especially low-income and frontline communities, must have the resources to ensure power access, air conditioning, air filtration, pharmaceutical refrigeration, transportation, food, shelter, and other supplies during climate-caused events.

- Clinical practice and technology assessment
 - The healthcare supply chain, as scope 3 emissions, comprise the vast majority of healthcare emissions. Clinical practice choices in supply chain management, as well as care delivery itself, has an enormous impact on institutional emissions from the delivery of care.
- Health care organization and delivery systems
 - The health care sector is lagging behind other sectors in terms of their sustainability and emissions reduction efforts, despite the enormous health impacts of climate change. Health care organizations need to understand evidence based practices that reduce emissions and build climate resilience without compromising patient care.

As importantly, AHRQ should create a research center specifically about climate change, health, and health care with robust funding and technical assistance for health services research and research training at leading U.S. universities and other institutions.

In addition, AHRQ should work with ASH, ASPR, NIH, and CDC to update the 2014 HHS Sustainable and Climate Resilient Health Care Facilities guidance.

2. How can AHRQ incorporate climate change and environmental justice issues into its core competencies of healthcare systems research, practice improvement, and data & analytics?

AHRQ can help build evidence regarding a) current and future impacts of climate change on health and care delivery; b) effective and cost-effective strategies for equitable health adaptation to climate change; c) climate change mitigation strategies that will best protect health and equity; and d) strategies and methods for a net-zero, climate-ready health care system.

AHRQ can assist with collecting, analyzing, and sharing health care data to provide the basis for characterizing health inequities and disproportionate impact of climate change on climate-vulnerable, Black, Indigenous, and people of color (BIPOC), and frontline communities. This research should integrate the results of [EPA STAR RFA](#) into research, program design, and implementation.

Furthermore, AHRQ should:

- Incorporate measures into performance management systems.
- Provide training to staff and funded research teams.
- Expand stakeholder relationships and lift up organizations already doing this work.

3. What are the most pressing healthcare-related areas of climate change and environmental justice research and actions that AHRQ could address? Relatedly, what evidence do healthcare systems and policymakers need to make decisions on responding to climate change?

Despite the widespread impacts of climate change, as with COVID-19, vulnerable and historically marginalized populations are most often harmed “first and worst.” Systemic racism and economic and health inequities that have led to much higher death rates and serious illness from COVID-19 among people of color, the poor, those with physical and mental health disabilities, and the elderly, are replicated with climate change. These discrepancies need to be researched and understood better.

Events over the past decade – such as Hurricane Katrina, Superstorm Sandy, Hurricanes Harvey and Michael, the Northern California Camp Fire, and the recent Pacific Northwest heatwave – have

demonstrated that many U.S. health systems and communities are not prepared for the new weather extremes and health needs posed by a changing climate.

Every community and every person in America is at increasing risk from the health impacts of climate change. But climate change disproportionately impacts children, older adults, pregnant people, people with disabilities and communities of color and low-income communities that additionally bear the burdens of systemic racism and historical disinvestment. Research is needed on climate and health impacts that will enable an effective health response to climate threats. This needs to include support for health systems to perform community climate-health risk assessments, with a focus on those patients most vulnerable to climate impacts such as extreme heat, to enable access to expanded disease surveillance systems as well as early warning systems to aid in preparation for the influx of patients and prevention when possible.

The best available and reliable climate data is needed for planning climate-resilient health care facilities, and coordinating with the other relevant federal agencies like [NASA](#) and [NOAA](#) that develop and analyze climate change projections. One of the barriers to achieving climate-resilient healthcare infrastructure is access to accessible and accurate climate projections. Health care organizations cannot rely on projections for extreme weather based on historical data that is currently available from FEMA. Resources are needed to provide access to projections that take climate change into account such that public health and health care systems can adequately plan and prepare to remain operational in the face of extreme weather events and wildfires.

Furthermore, AHRQ should:

- Assess direct hospital emissions impact on local air quality.
- Create a normalized GHG emissions benchmark (GHG per patient activity and/or acuity) for hospitals and health centers in the United States.
- Identify GHG avoidance benefits of value-based care programs (Medicare Shared Savings Program, etc.)
- Determine how environmental community-based health work reduces health care costs and improves family and community resiliency – so payers and providers will proactively pay and refer for these services (home improvements like energy efficiency, air quality, air conditioning, etc.).
- Assess economic impacts of health effects of climate change and extreme weather events on health systems.

4. How can AHRQ help healthcare systems prepare for and respond to the impacts of climate change on patient care, especially for vulnerable populations?

AHRQ has an enormous opportunity to address health equity and the disproportionate health impacts of climate change. AHRQ should:

- Support research and funding for initiatives designed to address community health resilience, where resilient, healthy communities are those whose determinants of need are met. See HHS

Public Health Emergency (PHE) site on [Community Health Resilience](#), including the strategies to build resilient communities.

- Examine/prioritize reduction of co-pollutants in environmental justice (EJ) communities.
- Integrate cumulative impacts of all public health and environmental risks experienced by EJ populations when considering patient care, quality, and outcomes.
- Consider how cumulative impacts affect EJ populations' ability to adapt to and recover from climate disaster and how those impacts affect the social determinants of health.
- Build on AHRQ's past research related to health impacts of wildfires and hurricanes to include health impacts of other climate disaster/extreme weather events, and provide data and best practices to reduce these effects through care delivery.
- Provide planning tools for continuity of care for home health patients in extreme weather, power outages, etc.
- Provide planning tools for mobility and accessibility of workforce to community- and home-based patient care locations.
- Update and expand upon [HHS climate resilience toolkit](#) and translate for different facilities and region types.
- Research the funding needs of health systems to become climate resilient (continuity of care for hospitals and health facilities) to support policy and governmental support.
- The Administration for Native Americans (ANA) and the Office of Human Services Emergency Preparedness and Response (OHSEPR) have archived recommendations related to community health resilience that are consistent with the HHS PHE recommendations referenced above. AHRQ should learn more about the projects that are referenced there, including the [National Preparedness and Response Science Board's Community Health Resilience recommendations](#).

5. What role could AHRQ play in identifying, gathering, and disseminating data on climate-related risks and impacts, and making the information timely and easily available for researchers, healthcare systems, and policy makers?

AHRQ can play a critical role in identifying, gathering, and disseminating data on climate-related risks to communities and health care systems, including health impacts from U.S. climate-related events, to better prepare for changes in patient delivery and health outcomes, patient surges in the delivery of care, and expanded health care service needs.

Expand Hospital and Health Systems Research and Technology Assessment agendas to include:

- Research on safe, efficacious, low-carbon-footprint medical treatment.
- Research on health system resilience in face of extreme heat, large-scale smoke events, and other climate-related threats to health.
- Quantify and publish climate- and environmental justice-related health outcomes. A necessary step to do so would be to create and implement codes for climate, environmental justice, or social determinants of health (expand upon z-codes).

- Capture and publish race/ethnicity attributes on all patient-related data.

6. What practice improvement resources (e.g., tools, strategies) could AHRQ provide to help healthcare systems improve patient safety and system resiliency during climate-related emergencies?

Health care's ability to adequately respond to climate-related emergencies like extreme weather events has become more critical with the increase and longer duration of these events. Furthermore, the COVID-19 pandemic has exposed the fragility of supply chain infrastructure that supports health care to climate related events.

Health care must become more resilient to climate-related emergencies in order to keep its doors open and provide health care services. AHRQ can also build on the report [Safe Haven from the Storm: Protecting Lives and Margins with Climate-Smart Health Care](#) and collect more case studies of health system resilience, identifying best practices and effective strategies to address climate impacts.

Health care also needs to help build community resilience, which can reduce the demands on the health care system by preventing climate related illness and accidents from occurring. [Resilience 2.0: Health Care's Role in Anchoring Climate Resilience](#) is a good resource outlining how health care organizations can become more resilient to the effects of climate change.

AHRQ should also be aware of the [Healthcare Anchor Network](#) (HAN) as another way for health care organizations to build their own institutional climate resilience as well as that of their communities. HAN is a national collaboration of 65+ leading health care systems working together to create equitable health outcomes for America's communities by tackling the underlying economic and racial disparities that drive them—the structural determinants of health.

Finally, health care fully decarbonizing by the year 2050 is a critical strategy toward building resilience in the health care sector. Health systems can join the campaign [Race to Zero](#) or the [Health Care Climate Challenge](#) and use the [Global Road Map for Health Care Decarbonization](#) to support their decarbonization efforts, which in turn will provide important steps to ensure that health care systems are adequately prepared for future climate impacts.

7. What are the training and education needs of healthcare professionals related to climate change and what role could AHRQ play in addressing those needs?

Robust education and curriculum about the intersectionality of climate change, health and health care are necessary to prepare all health professional students - medical, nursing, veterinary, dental, pharmacy, masters of health administration and more - to care for patients in a changing climate. Surveys such as [Perspectives on climate change in medical school curricula—A survey of U.S. medical students](#), have revealed that the majority of medical students believe that the health impacts of climate should be included in curricula and current content is inadequate. Increasingly, medical students are calling for rapid integration of climate-health content into curricula, with students often leading efforts to create curricula and other educational programs. The [Planetary Health Report Card](#) is a student-driven, metric-based initiative to inspire planetary health and sustainable healthcare education engagement in medical schools, with plans to expand to nursing and pharmacy schools.

In addition to medical students, other health professional students are leading efforts to create climate-health curricula. Masters of health administration students have [created guidance](#) how MHA programs can incorporate sustainability into the curriculum, and pharmacy students are working to [develop educational content](#) about the environmental impact of pharmaceuticals.

In 2019 the AMA passed a resolution calling for inclusion of climate change and health content in medical education at the undergraduate, graduate, and continuing medical education levels - [H-135.919 Climate Change Education Across the Medical Education | AMA](#) yet very few medical schools and residency programs have formally integrated such education into curricula. Examples of existing medical school climate-health curricula include the [Climate Change Infusion Project](#) at Mount Sinai School of Medicine and the [Climate Medicine elective course](#) at University of Colorado School of Medicine. Other examples are included in the [Climate and Health Curriculum Reform Guide](#) created by Medical students for a Sustainable Future (MS4SF).

Education about the climate-health-health care intersection should be continued throughout training programs, and there is opportunity to create robust curriculum in all medical residency programs. While very few residency climate curricula programs exist, guidance does exist. Philipsborn et. al. propose a framework of climate change and health educational content for residents, including how climate change (1) harms health, (2) necessitates adaptation in clinical practice, and (3) undermines health care delivery - [Climate Change and the Practice of Medicine: Essentials for Resident Education](#) - framed around exposure pathways. Massachusetts General and Brigham and Women's Hospitals have created a practical guide for integrating climate and health education into the resident education - [Climatizing the Internal Medicine Curriculum](#) - framed around medical subspecialties.

The three resources shared above (MS4SF Climate and Health Curriculum Reform Guide, Climate Change and the Practice of Medicine: Essentials for Resident Education and Climatizing the Internal Medicine Residency Curriculum), all provide valuable frameworks for climate and health education that can be adapted for curriculum development not only in medical schools and residency/fellowship programs, but for all health professional curricula and educational programs.

However, there is opportunity to broaden this framework to contain more robust, comprehensive content about the climate footprint of the health care sector and role of health professionals in reducing the impact.

Clinical care is the single largest factor driving health care emissions and pollution. In addition, the majority of health care emissions are indirect Scope 3 emissions and derive largely from the supply chain - pharmaceuticals, medical supplies and devices, food - and their up- and downstream activities. In the process of providing care, clinicians order tests and treatments, prescribe pharmaceuticals, screen for medical conditions, use supplies and devices (often single-use disposables), and perform surgeries and procedures - all resource requiring, emission-generating activities. Such interventions can be overused and may not always add value, with a [low-value test or procedure delivered to an older adult every 80 seconds in a U.S. hospital](#), and can contribute to both wasteful health care spending and pollution. While the previous attention to low-value care has been motivated by cost reduction and patient safety, reducing overdiagnosis, overprescribing, and overtreatment can also help lower emissions. There is an opportunity to educate clinicians about the impact of clinical care.

There is a need to educate clinicians about the impact of both clinical and low-value care, and how their choices - prescribing, selection of anesthetic agent, device and supply use, testing and screening etc. - influence health care's climate footprint. In addition clinicians should be educated about the opportunities to move towards efficient, value-driven care, and preventive health.

Recommendations for education and curricula content include:

1. **Impact of unnecessary, wasteful, low-value medical care**, along with opportunities to create more efficient clinical care pathways. Sherman et.al. explore value-based care in this article [Net zero healthcare: a call for clinician action](#) as do authors in this article [Applying an environmental](#)

[lens to value-based care: A resident-driven pilot project to limit laboratory testing on an internal medical ward service.](#)

2. **Preventive health and the need to reduce the demand for health care utilization.** Acute and chronic illness lead to health care utilization, which generates emissions, which in turn leads to increased burden of disease. For health care to become more sustainable, there must be a focus on disease and injury prevention, which would reduce the demand for health care utilization and lessen emissions. This is explored in the Sherman article shared above. There is opportunity for education about (reference for some recommendations are from [Net zero healthcare: a call for clinician action](#))
 - a. Healthy diets, especially the climate-health benefits of plant-based diets
 - b. Evidence-based lifestyle approaches to disease prevention (in coordination with traditional treatment): exercise, active transport, yoga, acupuncture and massage
 - c. Nature prescribing
 - d. Alcohol and substance abuse cessation
 - e. Stress management
 - f. Firearm safety
 - g. Anticipatory guidance and opportunities for patient education e.g. how to find cooling centers during heat waves, how to avoid tick-borne illness, how to get information about high heat index, high pollen count days etc.
3. **Health care sustainability science:** health care emissions research, including life cycle assessment, is critical to quantify health care emissions and provide data to allow medical professionals to make evidence-based decisions to improve the environmental performance of clinical care. Also known as healthcare sustainability science, this research “explores dimensions of resource consumption and environmental emissions associated with healthcare activities, and provides tools and metrics to quantify the unintended consequences of healthcare delivery and evaluate effective approaches that improve patient safety while protecting public health.” [The Green Print: Advancement of Environmental Sustainability in Healthcare](#) is a review of the scope of health care sustainability research.
4. **The impact of pharmaceuticals,** including anesthetic gases and inhalers. The pharmaceutical industry has a large climate and environmental footprint. US health care is very pharmaceutical-intensive. Anesthetic gases, especially desflurane and nitrous oxide, are potent greenhouse gases, as are hydrofluorocarbons, used in multi dose inhalers (MDI). There is opportunity for education about:
 - a. “Green” pharmacy- limiting quantities and refills, reduction of unnecessary pharmaceutical use, non-pharmaceutical treatments and interventions, patient education about proper medication disposal, deprescribing, following guidelines and making evidence based prescribing decisions. This would also include education about less environmentally damaging anesthetics (total intravenous anesthesia, isoflurane and sevoflurane) and inhalers (dry powdered inhalers)
5. Opportunities for clinicians to reduce the impact of health care delivery and promote climate-smart health care including, but not limited to - evaluating clinical practice, research,

education, communicating the health imperative for sustainable health care to leadership, exploring opportunities for tele-health along with reducing business travel and employee commutes

Finally, there is an opportunity to utilize the electronic medical record (EMR) as a tool to educate both clinicians and patients. Possibilities include, but are not limited to:

1. Relevant patient discharge instructions - e.g. proper medication disposal, staying safe in heat waves and other extreme weather conditions, list of local cooling centers, health and climate benefits of plant-centered diets.
2. Electronic flags and warnings - e.g. flagging medications that impair thermoregulation during heat waves, opportunities for deprescribing.
3. Real time feedback to clinicians about clinical choices - e.g. when anesthesiologist orders desflurane there is an automatic prompt asking if they considered TIVA or another agent, or anesthesiologist gets automatic monthly report about emissions associated with anesthetic choice.

8. What key research has been conducted to assess or mitigate the impact that healthcare has on climate change? What are effective strategies to measure and reduce the carbon footprint and other environmental impacts of the healthcare sector?

The health care sector has a unique responsibility and opportunity to act in mitigating climate change. Health care is the only sector with a healing mission and has committed to “do no harm,” and yet its operations contribute significantly to climate change, and as a result, to the very diseases it is trying to treat.

Health Care Without Harm (HCWH) has produced several reports analyzing the contributions of health care to climate change and proposing solutions, strategies and targets to guide efforts to mitigate that contribution by decarbonizing health care facilities and medical supply chains.

HCWH’s 2019 Report [“Health Care’s Climate Footprint: How the health sector contributes to the global climate crisis and opportunities for action”](#) defines health care’s climate footprint and outlines a set of actions the sector can take to align itself with the ambition of the Paris Agreement while simultaneously achieving global health goals.

Building on that work, HCWH’s 2020 Report [“The Global Road Map for Health Care Decarbonization”](#) maps out a path to net zero emissions for the health care sector globally, including country specific trajectories that account for the need of some countries to grow their health care systems to serve their populations. In addition, the [Climate Action Playbook for Hospitals](#) provides examples of U.S. health systems operationalizing climate solutions.

On a more local level, HCWH’s 2020 report [“Metropolitan Boston Health Care Energy & Greenhouse Gas Profile 2011 through 2019, and 2030 Projection”](#) produced on behalf of the Boston Green Ribbon Commission Health Care Working Group, provides a metro area level look at energy use and resulting climate impacts from greater Boston health care facilities and maps out broad strategies for that sector to meet Boston’s climate targets, including a 50 percent reduction in GHG emissions by 2030 and 100 percent reductions by 2050. The report also identifies key challenges for decarbonizing the sector.

In addition to HCWH's work on the topic, Jodi Sherman and Mathew Eckelman's 2018 paper "[Environmental Impacts of the U.S. Health Care System and Effects on Public Health](#)" and 2020 paper "[Health Care Pollution And Public Health Damage In The United States: An Update](#)" estimates the carbon emissions directly and indirectly attributable to the health care sector is responsible for 8.5 percent of all U.S. greenhouse gas emissions, with hospitals generating over one-third of those emissions, and has harmful effects on public health. Health care facilities can implement changes that decrease greenhouse gas emissions while reducing operating costs and promoting resiliency. Health care can also leverage its enormous purchasing power, 18 percent of U.S. GDP, to help decarbonize its supply chain, the largest portion of the sector's carbon footprint.

Health care emissions research, including life cycle assessment, is critical to quantify health care emissions and provide data to allow medical professionals to make evidence-based decisions to improve the environmental performance of clinical care. Also known as healthcare sustainability science, this research "explores dimensions of resource consumption and environmental emissions associated with healthcare activities, and provides tools and metrics to quantify the unintended consequences of healthcare delivery and evaluate effective approaches that improve patient safety while protecting public health." [The Green Print: Advancement of Environmental Sustainability in Healthcare](#) is a review of the scope of health care sustainability research.

Key research questions facing the health care system as it moves to decarbonize include:

- How to decarbonize health care's thermal energy systems, including district steam, and combined heat and power (CHP) systems, that are often powered by fossil fuel combustion, without sacrificing facility resilience which is becoming increasingly critical in the face of climate impacts;
- How to modify codes and regulations governing health care facilities to allow for electrification of and improvements to the energy efficiency of these energy intensive clinical facilities without sacrificing infection prevention and other critical health care goals;
- How to maximize the health, and health equity, benefits of the transition away from fossil fuels;
- How decarbonization of health care facilities can also contribute to more robust and resilient energy systems beyond hospital walls, building the resilience of the communities those facilities serve to the growing impacts of climate change;
- How to improve the energy efficiency, and reduce the carbon footprints of energy intensive lab space without interfering with their scientific goals.

9. What has been learned about health systems' capacity and limitations during the COVID-19 pandemic that can help care delivery organizations better address climate change impacts and reduce disparities?

The COVID-19 crisis has provided a glimpse into a potentially dystopian future. People all over the world are already feeling the impacts of climate change - extreme heat, wildfires, hurricanes, and floods, the spread of infectious diseases, drought and food shortages, mental health impacts and becoming climate refugees. COVID-19 has laid bare our health systems' lack of preparedness and the systemic racism and inequities in our society that can no longer be ignored. We have seen significant supply and staffing shortages that resulted in delays and lack of access to care. Elective procedures and routine medical care

were put on hold leading to increased morbidity. We have seen an egregious disparity in morbidity and mortality rates between white people and people of color. Research showed differences were tied to exposure to [air pollution](#) as well as historical health disparities due to racism.

Extreme weather events due to climate change pose similar challenges to the COVID-19 pandemic. For example, after Hurricane Maria, there was a national shortage of IV bags because the primary source of the supply was a manufacturing plant in Puerto Rico. In the Pacific Northwest heatwave in the summer of 2021 175 record high temperatures were set in Northern California, Oregon, Washington, and Idaho between June 25 and 30. There were nearly 2,800 heat-related illness visits to hospital emergency departments (EDs) in the region that week, providing a shocking contrast to previous conditions. On June 28, 2021, there were [1,038 heat-related illness ED visits](#) in that region compared to nine on the same day in 2019. This resulted in overwhelmed emergency departments with patients being treated in the hallways and waiting long hours for care.

COVID-19 and climate change also both impact the financial sustainability of our hospitals and lead to closures of the facilities that care for the most vulnerable. Halfway through 2020, Avalere, a leading healthcare consulting firm, projected that hospitalizations from [COVID-19 could cost U.S. healthcare systems](#) between \$9.6 billion and \$16.9 billion for the year. By October 2020, nearly [50 hospitals had closed or filed for bankruptcy](#), many in rural regions and low-wealth communities. According to NOAA, as of October 2021, the United States experienced [18 weather/climate disaster events with losses exceeding \\$1 billion each](#), resulting in 538 deaths and significant economic effects on the areas impacted. The annual average for billion-dollar disasters for the most recent 5 years (2016–2020) is 16.2 events compared with an annual average of 7.1 events for 1980–2020. New Orleans' Charity Hospital permanently closed in 2005 following Hurricane Katrina and it took 12 years for the suite of services previously provided by Charity to be fully restored at a newly constructed University Medical Center of New Orleans.

We have seen three key areas of response to the pandemic - leadership, adaptation, and innovation - that can help health care organizations better address climate change impacts and reduce disparities. Leadership has been needed at every level - global, national, state, county, and municipality - to address the COVID-19 crisis. Policies like mask mandates and coverage for telehealth allowed us to limit the spread of the virus and provide continued access to care.

Climate change is also a global crisis and we need the same leadership and coordination at every level of government and in communities, with policies, regulations and incentives helping health care organizations be prepared for climate impacts. AHRQ can support this need by ensuring the research is funded and the findings and data are available to policymakers to implement science-based policies and programs.

As made clear in the [IPCC Sixth Assessment Report](#), even if we act now to avoid the most catastrophic impacts of climate change, there are significant changes already locked in for the future to which we must adapt. What health systems need to do to [harden their facilities to be climate resilient](#) and the benefits of doing so are becoming well understood. Every health facility requires its own geographically-appropriate solution but all must assess future environmental conditions due to climate change, invest in materials to withstand extremes, secure critical equipment and incorporate redundancy, and design for adaptability. The 2014 HHS toolkit to build health care sector resilience, [Primary Protection: Enhancing Health Care Resilience for a Changing Climate](#), is a key resource that should be updated and implemented across the sector. There is a strong [business case for investing in facility resilience](#) but this can be harder for safety net, rural, tribal, and territorial health systems. During the COVID-19 pandemic, we saw a flawed formula for the distribution of pandemic relief funds that

resulted in hospitals that serve a greater proportion of wealthier, privately insured patients getting twice as much as facilities serving low-income patients on Medicaid or uninsured. As the Biden administration puts programs in place to support a resilient health system, it is critical that funding and technical assistance is directed to the health systems that serve the most vulnerable.

In response to the lack of personal protective equipment and other supplies during the COVID-19 crisis, we saw operational innovations for lower impact, local solutions including using blue wrap to make masks, partnering with local distilleries to make hand sanitizer, and implementing sterilization processes to safely reuse disposable equipment. We saw our health care systems offer telehealth appointments at scale in a matter of weeks, a transition we thought would take years. We need to ensure continued policy and financial support of shared solutions like telehealth that result in reducing the risk of COVID-19 spread, increased health access and improved outcomes, and decreased greenhouse gas emissions. AHRQ also can fund research to support innovation related to lower carbon pathways for clinical care and decarbonizing the thermal load of health care facilities.

The COVID-19 crisis has shown us what it looks like when we are unprepared and also that we can work together to change behaviors and systems at an unprecedented rate. In order to address the existential threat of climate change, we will need to take those lessons and quickly invest in climate-resilient health care facilities, with a focus on those that serve low-income communities and communities of color.

10. How might AHRQ take advantage of the existing national infrastructure to advance quality and safety (e.g., measurement standards, accrediting bodies, learning networks, incentives) to accelerate work on climate health and equity?

- Expand National Quality Strategy and Quality Measurement efforts to include climate resilience and environmental performance metrics.
- Work with [Health Care Without Harm](#) and [Practice Greenhealth](#) to review and build upon research, tools, and resources already in place.
- Create learning networks of health systems engaged in climate mitigation and resilience work, including members of the [U.S. Health Care Climate Council](#) members, to share learnings and in-depth case studies of successful initiatives, with separate learning networks focused on rural and safety-net hospitals.
- Research and explore how quality improvement incentives and accrediting bodies can expand to include health care climate mitigation and resilience.
- Work with the [National Academy of Medicine \(NAM\) Action Collaborative on Decarbonizing the Health Sector](#): NAM has launched a climate action Collaborative, a public-private partnership of leaders from across the health system committed to addressing the sector's environmental impact while strengthening its sustainability and resilience. The goal is to align around collective goals and actions for decarbonization, based on evidence, shared solutions, and a commitment to improve health equity.

11. Which organizations working on climate change response in healthcare should AHRQ learn from and collaborate with? Please describe the nature of the organization's work, evidence, and solutions, as applicable.

[Health Care Without Harm](#) (HCWH): HCWH is an international nonprofit founded in 1996 that works to help the health care sector reduce its environmental footprint, become anchors for community resilience, and advocates for environmental health and justice.

HCWH has regional offices and partner organizations in 10 countries. Its first campaign was focused on the elimination of mercury and medical waste incinerators, starting in one Boston hospital and scaling up to a global collaboration with the World Health Organization. The world's governments signed the Minamata Convention on Mercury in 2013, committing to the global phase-out of mercury in medical devices by 2020.

HCWH works with [health systems in the U.S.](#) and [around the world](#) to reduce their carbon footprint and prepare their facilities and communities for climate impacts. They aggregate the power of the health care sector to advocate for clean energy and climate-smart policies and accelerate the transition to a low-carbon economy that protects health and promotes equity.

- HCWH has a membership organization called [Practice Greenhealth](#) in the U.S. with a network of 1400 hospitals, 20% of U.S. hospitals, which we support in implementing sustainability practices.
- HCWH convenes a national [Health Care Climate Council](#) made up of 18 leading health systems from across the U.S. representing over 6,800 hospitals and health centers in 41 states, with 1 million employees serving over 74 million patients annually. The Council members implement innovative climate solutions, inspire and support others to act, and use their trusted voice and purchasing power to influence policy and markets.

[National League for Nursing](#): Dedicated to excellence in nursing, the National League for Nursing is the premier organization for nurse faculty and leaders in nursing education, offering professional development, nursing research grants, and public policy initiatives to its 40,000 individual and 1,200 institutional members. NLN members represent nursing education programs across the spectrum of higher education, health care organizations, and agencies.

[National Association of Pediatric Nurse Practitioners](#) (NAPNAP): With more than 8,000 members, NAPNAP is the professional association for pediatric nurse practitioners (PNPs) and all pediatric-focused advanced practice registered nurses (APRNs). Established in 1973, it is the only national organization dedicated to both advancing the APRN role and improving the quality of health care for infants, children and adolescents.

There are a number of other health, health care and medical organizations that are also able to provide valuable expertise on the public health and health care impacts of climate change, how public health and health care infrastructure are affected and the solutions to decarbonize health care and build a climate resilient health system. This list includes:

Allergy & Asthma Network • Alliance of Nurses for Healthy Environments • American College of Physicians • American Lung Association • American Medical Association • American Public Health Association • American Thoracic Society • Asthma and Allergy Foundation of America • Climate for Health • Climate Psychiatry Alliance • Mass General Brigham • Medical Society Consortium on Climate and Health • Medical Students for a Sustainable Future • National Association of Pediatric Nurse Practitioners • National Hispanic Medical Association • National League for Nursing.

As well as:

1. Centers for Disease Control and Prevention (CDC) [Climate-ready States & Cities Initiative: BRACE Framework](#)
2. [Department of Energy: Better Building Healthcare Workgroup](#)
3. [American Society of Health Care Engineering \(ASHE\)](#)
4. World Health Organization, Pan American Health Organization
5. Robert Wood Johnson Foundation
6. The Ellen MacArthur Foundation

HCWH and the below listed health and medical organizations are committed to addressing the climate crisis and advancing health equity and environmental justice. We look forward to engaging with AHRQ to help the agency better understand its role in addressing climate change impacts and the environmental justice implications and use its resources to fulfill its mission to produce evidence to make healthcare safer, higher quality, more accessible, equitable, and affordable, while working within the U.S. Department of Health and Human Services and with other partners to make sure that the evidence related to climate change impacts and solutions is understood and used. If you have any questions about our comments, please feel free to contact Antonia Herzog at aherzog@hcwh.org.

Sincerely,

Health Care Without Harm

Alliance of Nurses for Healthy Environments

American College of Physicians

American Medical Association

Climate for Health

Climate Psychiatry Alliance

Mass General Brigham

Medical Students for a Sustainable Future

National Hispanic Medical Association

National Association of Pediatric Nurse Practitioners

National League for Nursing