Common Health Coalition | Milbank Memorial Fund | Johns Hopkins Bloomberg School of Public Health | Center for Health Security

More Illness, Greater Cost Spotlight Brief: *Heat Emergencies*

Executive Summary

Building upon the Common Health Coalition's series of *"More Illness, Greater Cost"* reports, this Spotlight Brief demonstrates the health and economic impacts of heat emergencies, using a summer heat wave as a case study. A modeling analysis conducted by the Johns Hopkins Bloomberg School of Public Health finds that:

- **State Impact**: Under a scenario representing today's levels of public health preparedness, a significant heat wave – a period of unusually hot weather lasting five days – in one state could cause **300** deaths and **4,000** heat-related emergency department (ED) visits and preventable hospitalizations. Those impacts may generate approximately **$870 million** in total costs, including **$48 million** in medical costs, **$810 million** in disrupted livelihoods, lost wages, and diminished well-being and **$19 million** in other social costs.
    - If two large outdoor events took place during the heat wave, those impacts could be even greater – reaching approximately **$920 million** in total costs.

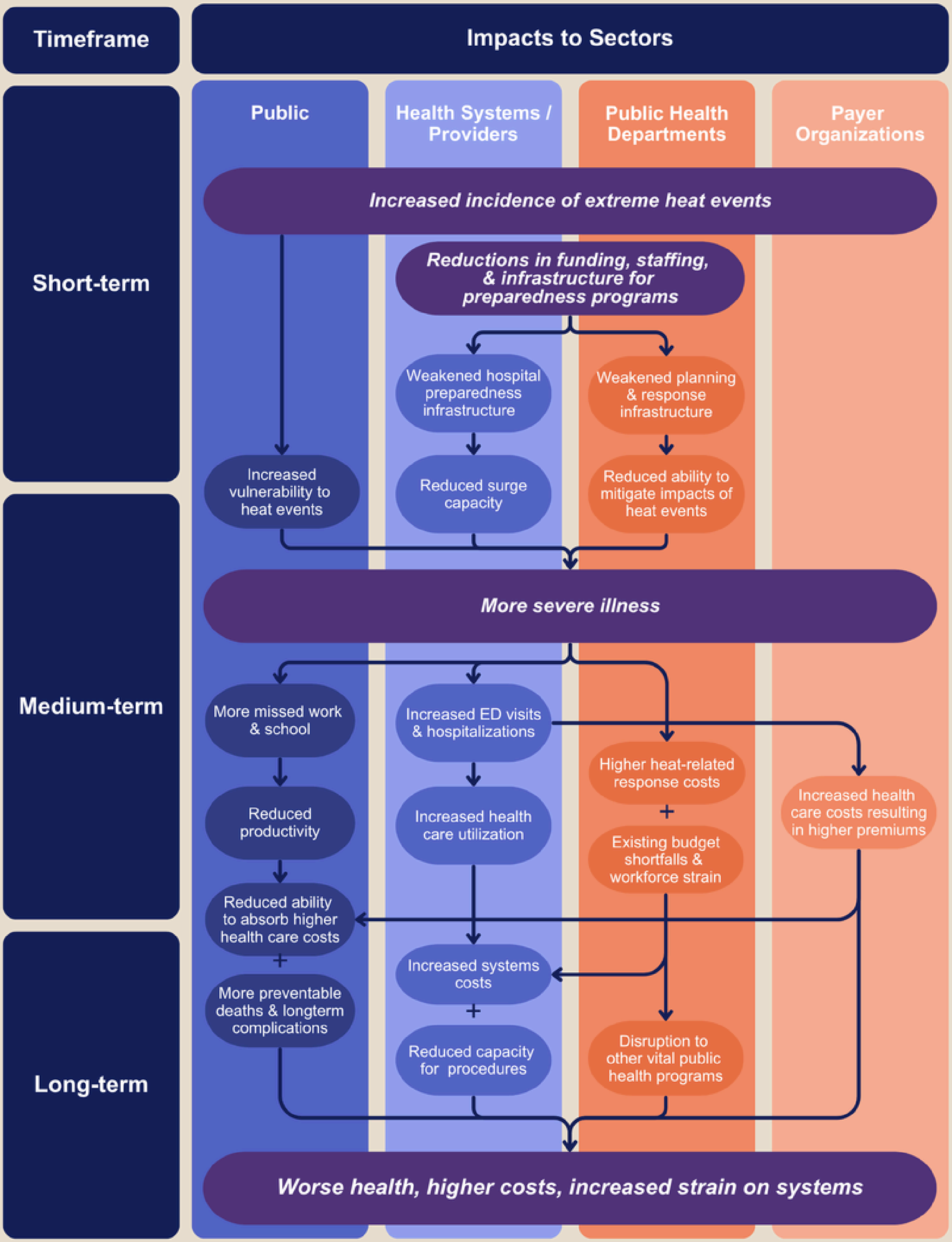
- **National Impact**: Given that the United States Environmental Protection Agency (EPA) estimates that the U.S. can expect roughly six heat waves each year across its largest metropolitan areas, findings from the modeling analysis suggest total costs for these heat waves could approach **more than $5 billion** annually nationwide.

Figure 1. State Impact of a Single Heat Wave

Human Costs	Economic Costs: $870 million
300 deaths	$810 million in lost productivity and quality of life
4,000 ED visits and preventable hospitalizations	$48 million in medical system costs
	$19 million in other social costs, like workers' compensation

Extreme heat, which is becoming increasingly common, is already the deadliest weather event in the United States, responsible for more deaths each year than hurricanes, floods, and tornadoes combined. At the same time, federal and state policy changes are eroding public health preparedness staffing and programs. When public health infrastructure is weakened, the consequences are more likely to be felt downstream. The greatest financial damage is an invisible tax on daily life, borne by parents forced to miss work, hourly employees losing vital income, and local employers facing sudden operational paralysis. Hospitals and health systems face financial and operational strain from surges in emergency department visits and hospitalizations, payers absorb increased health care expenditures, and public health agencies deploy emergency resources to mitigate harm to affected communities.

Figure 2. Impacts of Weaker Public Health Infrastructure Amid Increased Incidence of Extreme Heat Events



But these impacts are not inevitable. Past emergencies have shown that investments in preparedness and response capabilities can be both life-saving and cost-saving**.** Investments that yield reductions in adverse health outcomes by 10-30% during a heat event have the potential to save a state an estimated **$210 million** in overall costs, according to the model.

Achieving meaningful reductions in deaths, hospitalizations, and other preventable harms requires coordinated action across public health, health care, employers, payers, and policymakers. This brief outlines the evidence and actionable steps to reduce the impacts of extreme heat, from immediate interventions that blunt the effects of heat waves (e.g., cancelling large spectator events) to long-term structural investments that address upstream risk factors and strengthen resilience.

Modeling the Impacts

Using available health and economic data, researchers from the Johns Hopkins Bloomberg School of Public Health developed a data-driven scenario that describes a compounded heat emergency in an archetypal community in the U.S. Modelers then characterize the potential human and economic costs of such a heat emergency to demonstrate the widespread impact on health outcomes, health systems, and society.

Figure 3. Who Is Most At-Risk for Severe Outcomes?

- Infants, young children, pregnant people, and elderly individuals
- People living without air conditioning
- Workers without climate-controlled environments
- People experiencing homelessness
- People with chronic physical or mental health conditions

ESPECIALLY AT HIGH-RISK

Anyone in these categories taking psychoactive medications, diuretics, or other drugs that interfere with the body's ability to regulate temperature.

Extreme heat can affect anyone, but these factors increase risk for severe illness and death

The Scenario: A Single Heat Wave

In late July, a hypothetical metropolitan area experiences a five-day heat wave with daytime highs of 96–104°F (36–40°C) and nighttime lows above 70°F. These temperatures are unusual but not unprecedented for the region. During the same period, two large outdoor spectator events are scheduled: a single-afternoon sporting event and a weekend-long music festival with all-day activities. Each event is expected to draw 20,000–30,000 attendees, plus staff, volunteers, media, and vendors, bringing significant foot traffic to venues and surrounding neighborhoods. On day three, peak electricity demand triggers rolling brownouts that affect roughly 250,000 customers for about 24 hours, with the urban area hardest hit. Many residents lose air conditioning and power for home medical devices. Hospitals switch to backup power and delay or cancel some elective procedures to conserve resources.

This scenario represents a moderate heat event – temperatures that would be considered high in some parts of the United States. Similar impacts can occur even during less extreme heat, and the effects would likely become more severe as temperatures rise. What counts as a “heat wave” depends on regional climate norms and local adaptive capacity, including access to cooling in homes and businesses. The scenario also assumes a moderate level of public health preparedness and response capacity, roughly reflecting current resource levels on average across states.

The model separately assesses the impacts of the two outdoor events proceeding as planned, rather than cancelling, relying heavily on generators, and the impacts are even greater. Some vendors are disrupted, and safe food handling becomes more difficult. Thousands seek on-site care for heat-related illness; a portion require transport to area hospitals. Hot conditions and intermittent power also lead to several foodborne outbreaks as some food becomes unsafe. Outdoor workers in sectors such as construction, landscaping, transportation, and public works face elevated heat exposure, while in nearby rural communities, agricultural workers experience similarly severe risks. See Appendix for detailed data tables.

Heat Wave Impacts Scaled Nationwide

This modeling scenario focuses on a single heat wave in a metropolitan area, however, heat waves can occur anywhere in the U.S. Across the 50 most populous metropolitan statistical areas with available data, the EPA estimates that the U.S. can expect roughly six heat waves per year in American cities comparable to the one modeled in this analysis.[1]

While medical and response costs vary by region, these estimates provide a reasonable benchmark for other locations. If six heat waves were to occur in similar settings, this analysis suggests that the total national costs associated with heat waves could exceed $5 billion annually.

Heat-related illnesses do not occur solely during a heat wave, and the costs associated with those instances would be in addition to the analysis presented here. Using data from Virginia, extrapolated nationally, prior modelers have estimated that heat-related or heat-adjacent illnesses result in approximately $1 billion just in direct medical costs alone in the U.S. annually.

About the Model

This cost analysis uses a semi-quantitative risk assessment framework linking heat and health risk data, epidemiologic and demographic parameters to estimate case counts, hospitalizations, deaths, and costs under the defined scenario. Full methodology, the ranges for modeled projections, and underlying assumptions are described in the accompanying manuscript. To address and report on uncertainty, the analysis included a Monte Carlo simulation. Most calculation inputs were in the form of probability distributions rather than point estimates. Results are reported as ranges which represent the 90% confidence interval; in other words, the 5th and 95th percentile values from the Monte Carlo simulation (90% CI). Figures are rounded to two significant figures for readability and to avoid false precision. All costs are in USD millions [90% CI].

Who Pays – The Cost of Unpreparedness

Costs to health care systems, payers, clinicians: $48 million in estimated direct medical costs

In this scenario, the unusually high temperatures, increase both the likelihood and the volume of primary heat illness and heat-exacerbated chronic conditions. Greater illness will drive higher health care demand, particularly from Emergency Medical Services (EMS), urgent care, and hospitals across the region. Older

[1] U.S. Environmental Protection Agency. (2024). Climate change indicators in the United States (Fifth ed., EPA 430-R-24-003

adults and outdoor workers are at greatest risk, particularly those with heart disease, asthma, and other chronic respiratory illnesses. Nearby urgent care centers and emergency departments will still see surges in low-acuity cases – like dehydration, alcohol-related issues, minor injuries – and a smaller number of higher-acuity events like cardiac symptoms.

Rolling brownouts will disrupt dialysis and electrically powered medical devices, leading to additional acute care needs and EMS transports. Delayed care and canceled elective procedures will result in lost revenue for the health care system and have longer-term health consequences for patients. Higher utilization translates directly into higher all-payer costs, with Medicare and Medicaid likely bearing a substantial share given that heat-related illness disproportionately affects older adults and low-income populations.

Costs to employers: $19 million in estimated costs for workers' compensation
The estimated direct cost to employers is $19 million, reflecting workers' compensation expenses associated with heat-related injuries and illnesses. These costs represent the financial burden on businesses when employees are affected by extreme heat, including medical claims, wage replacement, and other related compensation expenses.

Societal costs: $810 million in economic losses associated with heat-related deaths, illnesses, and disabilities and reductions in well-being
The estimated societal cost of this heat event is $810 million, reflecting the economic losses associated with heat-related deaths, illnesses, disabilities, and declines in well-being. This figure captures the broader value of lost healthy life, reduced productivity, and diminished quality of life across affected communities. In other words, the burden of the event extends beyond immediate medical costs to include the wider social and economic consequences of heat exposure.

Costs to public health systems: Public health heat-related response costs have not been characterized in the literature
During a heat emergency such as the one described here, public health agencies may activate a wide range of response activities, including opening cooling centers, deploying wellness check teams, conducting heat surveillance, coordinating with hospitals and emergency management partners, and implementing multilingual risk communication campaigns. Additional responsibilities may include maintaining backup power plans for health care and public health infrastructure, preventing disease outbreaks in congregate settings, supporting vector control, and responding to foodborne illness outbreaks associated with extreme heat and power disruptions.

Despite being core public health functions, the operational costs of these activities are rarely documented in the published literature and therefore are not reflected in this analysis. As a result, these estimates likely understate the true costs of extreme heat events. Staffing and operational demands increase with the size of the heat-vulnerable population and the level of preparedness required, with smaller and rural health departments often facing particular strain as the same workforce must manage emergency response while sustaining routine public health services.

This represents an important evidence gap. We welcome opportunities to work with state and local health departments to better document the staffing and operational costs of heat response activities so that future estimates more fully capture the resources required to protect communities during extreme heat events.

Weakened Public Health Infrastructure

When public health emergency response is well-resourced and functioning, it can contain crises earlier, thus reducing the number of people who get sick, the number of hospitalizations and deaths, and the financial impact on families, providers, payers, and public programs. When preparedness infrastructure is degraded, the opposite occurs.

Federal Funding Uncertainty Reduces Emergency Preparedness Capacity

For decades, a network of federal programs and grants across the U.S. Department of Health and Human Services (HHS) – including the Administration for Strategic Preparedness and Response (ASPR) and the U.S.

Centers for Disease Control and Prevention (CDC) – have been the main source of funding for the health infrastructure that prepares for and activates to protect public health in response to a heat emergency at the state and local level. Grants such as the Hospital Preparedness Program (HPP) and the Public Health Emergency Preparedness (PHEP) have long formed the backbone of the nation's capacity to respond to heat emergencies. That backbone is now threatened.

- **Federal preparedness and response funding**. The President's FY2027 Budget again proposes elimination of the $307 million HPP and halving of the PHEP cooperative agreements from approximately $735 million to $350 million, threatening capacity and continuing uncertainty for public health agencies. Without these critical investments, partners across the infrastructure work in silos and create gaps that become critically visible during emergencies. The proposed budget also reduces FEMA non-disaster grant programs by $1.3 billion, which would reduce local emergency managers' capacity to conduct exercises and maintain response readiness. Increasing uncertainty of the federal government's emergency support, including Presidential Emergency Declarations and FEMA reimbursement for expenses like cooling centers and business and individual losses, may also affect community access to these essential services.

- **CDC workforce, training pipelines, and contracts**. Recent HHS and CDC reductions-in-force have depleted the workforce needed to coordinate and provide expert guidance for large-scale heat emergency responses. Critically, these reductions have led to gaps in CDC's ability to monitor and forecast real-time impacts of heat on emergency department utilization and community health outcomes, making early warning and local rapid response more challenging.

- **Environmental health and climate adaptation programs**. Reductions to CDC's environmental health staff and proposed elimination of CDC's National Center of Environmental Health (NCEH) funded programs – such as the Climate and Health and National Environmental Public Health Tracking program – will leave communities without support for updated heat action plans, early warning systems, and related state-level climate adaptation planning grants. The 2027 budget also cuts National Oceanic and Atmospheric Administration (NOAA) by $1.6 billion, eliminating climate adaptation partnerships that public health agencies rely on for heat forecasting, emergency preparedness, and local climate planning efforts.

- **Community Health Worker (CHW) capacity**. CHW funding cuts, driven by early termination of HHS COVID funding and forthcoming Medicaid budget reductions, reduce the trusted community-based workforce most effective at reaching high-risk populations. These professionals are essential for proactive outreach, engagement, and prevention.

- **Data infrastructure and interoperability**. The already patchwork exchange of data between healthcare, public health, emergency management, preparedness, and social service benefits systems has been further eroded due to aging technology, continued lack of interoperability, and absent common data standards. Inconsistent ICD-10 coding practices for heat-related illness compound this gap, contributing to underreporting and complicating efforts to track the true health burden of heat events. [See: FAS GME Guidance]. Integrated real-time response data and communication are critical during protracted heat emergencies to coordinate community resources.

Medicaid and Coverage Cuts Compound the Threat

Heat-related illness disproportionately affects Medicaid-enrolled populations, including older adults with chronic conditions, pregnant women, infants, people with disabilities, those with serious mental illness, and low-income communities with less access to cooling. Medicaid cuts of nearly $1 trillion over the next decade will reduce access to primary care, emergency care, follow-up treatment, and chronic disease management that determine heat illness outcomes and survival. ACA marketplace subsidy losses will only further compound these effects for patients and the health care systems serving them.

Clinicians and health care facilities in under-resourced communities face financial pressure that limits their capacity to absorb patient surges during emergencies. The financial impact of increased volume and acuity – particularly when system capacity has already been strained – is substantial and often underestimated.

Beyond the Model: Operational Burden and Disruption

The modeled costs capture only a portion of the economic burden that a major heat emergency inflicts on health systems, employers, and communities. The operational strain on institutions, and the ripple effects across sectors, are substantial and often invisible in standard cost analyses.

Workforce and employer disruption. Heat-related illness and injury drive absenteeism, caregiving burdens for workers with affected family members, and workers' compensation costs, particularly in outdoor sectors and among indoor workers in non-climate-controlled environments such as warehouses, fast food kitchens, and transportation facilities. Employer health care expenses and premium costs rise with increased heat-related claims.

School and child care disruption. Extreme heat can disrupt school and child care operations by limiting outdoor activities such as sports practices, physical education classes, and marching band rehearsals. It can also force school and child care closures, while increasing the risk of heat-related illness when activities continue without appropriate heat-safety accommodations. Closures eliminate access to meals, hydration, and safe, cooled spaces for children. Parents, particularly those in lower-wage jobs without flexibility, must miss work or reduce hours, driving lost wages and productivity.

Safe food, water, and transportation infrastructure. Power outages, which increase during heat events as grid demand spikes, cause food spoilage, worsening food insecurity, spurring food-borne disease outbreaks, and disrupting food distribution supply chains. Increased water demand – for personal hydration and cooling, power generation, crops, and landscaping – can cause infrastructure failures affecting water quality and access. Extreme heat also causes direct transportation infrastructure failures: rail slowdowns and road buckling create cascading disruptions that affect access to health care, cooling, and essential supplies, particularly for those without personal vehicles.

Turning to Solutions

The impacts projected in this analysis are not inevitable. Health leaders across sectors can anticipate and mitigate these impacts by acting now, in partnership across sectors, before the next heat emergency. Below are a range of potential actions leaders can take, including recommendations from previous reports such as Brown University's "Protecting the Health of Americans in the Face of Extreme Weather." Preparedness enhancements that lead to even modest reductions in adverse health outcomes due to a heat event have the potential to save a state an estimated $210 million in overall costs.

All Health Leaders can:

Invest in structural interventions and heat mitigation measures that reduce risks throughout the season, such as heat resilient building codes, energy assistance programs, and access to medical care through Medicaid and other programs.

- Example: NYC Heat Mortality Report

Build and sustain regional preparedness coalitions that operate year-round. Establish ongoing cross-sector collaborations that develop shared data systems, dashboards, patient placement workflows, and relationships before emergencies occur.

- Example: Bexar County Heat-Related Illness Dashboard

Formalize partnerships between the health care system and public health for joint emergency response planning, including integrated response and communication protocols between public health, emergency management, EMS, and healthcare partners for surveillance, surge, and community resource coordination.

- Example: Northwest Healthcare Response Network

Engage school systems, community organizations, and community health centers in preparedness planning. Include training and protocols to ensure continuity of access to essential needs such as food, medication, and water during power outages. Include mitigation plans for large gatherings and criteria for cancellation.

All Health Leaders can (cont.):

Explore shared financing models like joint funding initiatives between payers and public health and pooled emergency reserves to buffer against federal and state funding volatility and stabilize local preparedness capacity. See:

- Common Health Coalition's Shared Financing Guide
- Public Health Bonds: A New Way to Fund a Healthier Future for America - Milbank Quarterly

Public Health Leaders can:

Conduct heat vulnerability assessments to guide targeted outreach and resource allocation. Use data to identify populations and geographies at greatest risk and inform response planning and prioritization of resources. Examples:

- Miami-Dade County heat vulnerability assessment model
- Minnesota heat vulnerability module for county all-hazard plans

Develop interoperable early warning systems that link climate, clinical, and public health data. Integrate meteorological forecasts with health surveillance and surge indicators (e.g., mapping of ED visit surges against Social Vulnerability Index data) to support timely heat alerts, response activation and preventive efforts, building on CDC and NOAA tools such as the CDC Heat Risk forecast tool. This tool gives seven day forecasts that allow response actions to initiate before temperatures spike.

Design equitable, accessible, and trusted community response systems. Ensure cooling centers address real-world barriers (e.g., transit access, ADA compliance, evening hours, pet-friendly policies) and pair with proactive outreach to isolated, homebound, and unhoused populations; invest in trusted messenger networks and clear public education, including guidance on medication safety and emergency preparedness during extreme heat. Examples:

- Harris County, TX cooling center equity model
- NYC cooling center accessibility research
- CommonSpirit Health guidance

Strengthen cross-sector coordination, behavioral health integration, and community resilience funding. Establish formal cross-system roles and resource-sharing protocols with after-action reviews; integrate mental health supports into heat emergency response and tracking; and support community-based organizations through mini-grants or decentralized funding to advance locally defined resilience priorities. Examples:

- Oregon Disaster Resilience Learning Network
- Washington State Climate and Health Adaptation Initiative CBO grants

Clinicians and Health Systems can:

- **Co-develop a written, individualized action plan** with every high-risk patient covering cooling refuges, medication storage, power outage contingencies, and a check-in contact. These plans should be documented in plain language in the medical record. Encourage patients to maintain an emergency medication supply. Examples:
- CDC's Clinician Heat Guidances
- Americares Providers Heat Action Plan

Proactively counsel patients on medication-heat interactions, with particular attention to diuretics, psychoactive medications, beta-blockers, and complex older adult patients. Discuss what signs of adverse drug effects to monitor. Examples:

- UCLAHealth Medications and Heat-Related Illness
- CommonSpirit Medications and Heat: A Guide for Staying Safe in the Summer

Clinicians and Health Systems can (cont.):

Screen for social vulnerability – including difficulty paying for utilities, transportation barriers, and lack of access to cooling – and connect high-risk patients with support resources proactively before heat events occur.

- Example: Kaiser Permanente's Social Health Initiative

Prioritize climate resiliency via infrastructure and capital planning including in the deployment of microgrids for hospitals and innovation around eliminating on-site fossil fuel combustion, reduction of local emissions, and air pollution.

- Example: UC Irvine, UCLA, and Kaiser Permanente advancing all-electric hospitals

Employers can:

Assess workforce heat vulnerability and coordinate with public health to target protections and supports. Identify workers at elevated risk, including those on heat-sensitizing medications or with chronic conditions, and partner with local public health to expand worksite cooling resources and wellness programs.

- Example: Health Action Alliance Managing Extreme Weather and Climate Risks: A Starter Guide for HR Leaders

Strengthen heat protections, benefits coverage, and workforce preparedness across clinical and occupational settings. Implement heat illness prevention policies for outdoor workers and indoor workers in non-climate-controlled environments; maintain coverage for prevention and treatment of heat-related illness and invest in extreme heat communications and alert systems; and ensure sick leave and caregiving leave policies account for heat emergencies, including school closures and caregiving disruptions. See resources from:

- NIOSH Workplace Recommendations: Heat Stress
- OSHA/NIOSH Heat Safety Tool App
- Health Action Alliance

Medicaid/State Purchasers and Other Payers can:

Stratify claims data by race, ethnicity, language, and ZIP code to identify high-risk members, map vulnerable populations and geographies, and assess contributing factors (including medications that increase heat risk), with findings shared with emergency management and public health partners to improve targeting of outreach and resources. Examples:

- Generalizability of Heat-related Health Risk Associations Observed in a Large Healthcare Claims Database of Patients with Commercial Health Insurance,
- Climate-Driven Health System Risk Modeling for Medicaid Resource Planning in Arizona

Partner with public health on shared financing for community-based heat resilience initiatives, and share de-identified population data to support risk stratification and proactive member outreach. Examples:

- Common Health Coalition's Shared Financing Guide
- Public Health Bonds: A New Way to Fund a Healthier Future for America - Milbank Quarterly

Explore coverage via 1115 waiver authority or other mechanisms to expand heat-mitigation supports for highest-risk members, including air conditioners, air filtration devices, medication coolers, backup power for durable medical equipment, and other in-home cooling supports, alongside home energy assistance for utility costs, particularly for electrically dependent patients and those without air conditioning, establishing cooling access as a preventive health intervention. Examples:

- At least 13 states cover an air conditioner benefit
- Oregon was the first state to provide ACs and other equipment as covered benefits
- NYC Cooling Assistance Program

Conclusion

Impacts from extreme heat emergencies are not random. The human and economic toll is largely determined by the strength of the public health and health care preparedness systems that respond to them. This analysis shows that public health and health care can work together to improve preparedness, even as current federal policy changes are challenging precisely the infrastructure needed to prevent a heat emergency from becoming catastrophic. The costs of unpreparedness, measured in preventable deaths and illnesses, overwhelmed hospitals, and millions in avoidable spending, far exceed the cost of maintaining and strengthening the systems we have already built. And those costs are not borne equally: the communities facing the greatest heat exposure are the same communities experiencing the deepest losses of health and public health resources.

Extreme heat is now impacting every region of the country, with increasing frequency and intensity. The preparedness infrastructure under duress today is exactly what will be needed tomorrow. Acting now – collaboratively, across sectors, and with urgency – is both the prudent fiscal choice and the most effective way to protect health, communities, and economic well-being.

This brief is part of a series of special reports on the ripple effects of weakened public health infrastructure across the health system. For more information and resources, visit CommonHealthCoalition.org/resources.

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Appendix: Modeled Scenarios

Heat Wave Costs					
Cost Categories	**Number of Events**	**Medical System Costs**	**Other Social Costs**	**Monetized DALY Loss**	**Total Costs**
Total Excess Death	300 [190, 410]	0.35 [0.22, 0.49]	3.5 [1.8, 5.7]	690 [170, 1520]	700 [170, 1530]
EMS Dispatch above Baseline	4000 [2800, 5400]	4.8 [3.3, 6.4]	2.2 [1.3, 3.3]	1.1 [0.6, 1.7]	8.1 [5.5, 11.1]
ED Visit (non-worker)	700 [470, 950]	0.53 [0.36, 0.72]	0.39 [0.22, 0.59]	0.19 [0.11, 0.29]	1.1 [0.7, 1.5]
Worker ED Visit	470 [310, 650]	0.36 [0.24, 0.49]	5.7 [3.8, 7.8]	0.13 [0.07, 0.2]	6.2 [4.1, 8.4]
Total ED Visits*	1200 [900, 1500]	0.89 [0.67, 1.11]	6.1 [4.1, 8.2]	0.32 [0.19, 0.47]	7.3 [5.1, 9.6]
Elective Procedure Canceled	210 [160, 280]	0.011 [0.008, 0.014]	0.021 [0.01, 0.036]	14 [3, 34]	14 [3, 34]
Hospitalized ED Heat Presentations	160 [110, 220]	2.4 [1.6, 3.3]	0.44 [0.24, 0.69]	4.6 [1.3, 10.1]	7.4 [3.7, 13.5]
Worker Hospitalization	25 [16, 36]	0.37 [0.24, 0.53]	0.069 [0.038, 0.11]	0.72 [0.18, 1.53]	1.2 [0.6, 2.1]
Dialysis Hospitalization	1600 [1300, 2000]	24 [19, 30]	4.5 [2.8, 6.4]	47 [13, 96]	76 [39, 127]
Home Medical Device Hospitalizations	730 [500, 1020]	11 [7, 15]	2 [1.2, 3.1]	21 [5, 46]	34 [17, 61]
Chronic Disease Exacerbation	250 [140, 370]	3.7 [2.1, 5.5]	0.69 [0.34, 1.15]	25 [10, 48]	29 [12, 54]
Total Hospitalizations	2800 [2300, 3400]	42 [34, 50]	7.7 [4.9, 10.9]	98 [37, 181]	150 [80, 230]
Total		48 [40, 56]	19 [15, 25]	810 [260, 1640]	870 [330, 1710]

Appendix: Modeled Scenarios

Mass Gathering Costs					
Cost Categories	**Number of Events**	**Medical System Costs**	**Other Social Costs**	**Monetized DALY Loss**	**Total Costs**
Total Excess Death	4.7 [2.3, 7.2]	0.0056 [0.0028, 0.0086]	0.056 [0.025, 0.099]	11 [2, 26]	11 [2, 26]
Food-borne illness	1900 [1100, 3200]	0.41 [0.23, 0.67]	1.1 [0.5, 1.9]	6.5 [3.1, 11.1]	7.9 [4.1, 13.4]
Event on-site presentation	2200 [1600, 2900]	0.88 [0.63, 1.15]		0.3 [0.17, 0.45]	1.2 [0.8, 1.6]
ED Visit (non-worker)	220 [140, 300]	0.16 [0.11, 0.23]	0.12 [0.07, 0.19]	0.059 [0.033, 0.094]	0.34 [0.22, 0.49]
Worker ED Visit	180 [120, 250]	0.14 [0.09, 0.19]	2.2 [1.4, 3.1]	0.049 [0.027, 0.08]	2.4 [1.5, 3.3]
Total ED Visits*	400 [280, 530]	0.3 [0.21, 0.4]	2.3 [1.5, 3.2]	0.11 [0.06, 0.17]	2.7 [1.8, 3.7]
Event Related Hospitalizations	85 [56, 121]	1.3 [0.8, 1.8]	0.24 [0.13, 0.38]	2.5 [0.6, 5.4]	4 [1.8, 7.2]
Worker Hospitalization	9.6 [6, 14.6]	0.14 [0.09, 0.22]	0.027 [0.014, 0.043]	0.28 [0.07, 0.62]	0.45 [0.2, 0.83]
Food-borne hospitalization	37 [21, 60]	0.21 [0.12, 0.35]	0.041 [0.019, 0.073]	25 [10, 49]	26 [10, 49]
Total Hospitalizations	130 [90, 180]	1.6 [1.1, 2.2]	0.3 [0.17, 0.48]	28 [12, 52]	30 [14, 54]
Total		3.2 [2.3, 4.2]	3.7 [2.6, 5.1]	46 [22, 81]	53 [29, 88]

**To avoid overcounting total medical costs, costs related to dialysis disruptions, home medical device failures, and chronic disease exacerbations are attributed to hospitalizations rather than ED visits, despite the fact that many of these patients may initially present to the ED. As a result, the breakdown of outcomes by care setting may underestimate ED visits.*