RICARDO LARA INSURANCE COMMISSIONER California Department of Insurance



# Impacts of extreme heat to California's people, infrastructure, and economy

Pioneering analysis measuring uninsured and insured costs of extreme heat events

Key Findings and Recommendations

#### Dear Readers,

The challenges presented by extreme heat are no longer a distant concern; they are an immediate and escalating threat to our health, infrastructure, economy, and overall wellbeing. Good data is essential for any strategy to be effective, and that's why I sponsored legislation in 2022 requiring this data to be collected and analyzed. This pioneering analysis, "Impacts of Extreme Heat to California's People, Infrastructure, and Economy," underscores the urgency of California's efforts to create a groundbreaking heat wave ranking and early warning system. It's a call for comprehensive strategies to address the previously unseen impacts of extreme heat.

Our Department has established itself as a global leader by continuing to be innovative in our approach to solutions for the climate risks we face. We want to assess the risks, encourage preparedness and risk mitigation, and establish cross-cutting partnerships with federal, state, and local governments, healthcare providers, businesses, and



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insurance companies to enhance resilience against extreme heat events. We also create a framework to measure the true costs of seven significant extreme heat events over the past decade, providing a detailed analysis of the financial and human tolls they exacted on our communities. The full spectrum of costs is likely much deeper than our preliminary estimates. From increased mortality rates and adverse health outcomes to significant economic losses across various sectors, the data presented is undeniable proof that we must act.

One of the major challenges we face is the disproportionate impact of extreme heat on vulnerable populations, including low-income communities, older adults, and outdoor workers. The findings underscore the urgency of developing targeted interventions and policies that mitigate the immediate effects of extreme heat and build long-term resilience. These strategies should be developed through conducting thorough risk assessments, involving local communities in planning, considering long-term sustainability, and ensuring that adaptation measures are equitable and environmentally sound to avoid making policy decisions that leave people behind or encourage adaptation measures that are more harmful than helpful. We want this analysis to help spur innovative insurance solutions and pre-disaster adaptation measures that can enhance our preparedness and response to future heat events.

Opportunities exist for improving our resilience to extreme heat. By investing in adaptive infrastructure, such as urban tree planting to reduce the "heat island" effect, and implementing comprehensive heat action plans, we can significantly mitigate the impacts on our communities. We want to partner in the development and promotion of innovative insurance products that protect outdoor worders, cover business interruptions, infrastructure and agricultural damages, and emergency services during extreme heat events.

I encourage all stakeholders, from local governments to private enterprises, to make the most of the insights and recommendations provided in this analysis. Through coordinated efforts and proactive measures, we can protect our people, economy, and environment from the increasing threats posed by extreme heat.

Let us use this report as a catalyst to foster greater cross-sector collaboration and drive forward-thinking solutions that will safeguard our state for generations to come.

Sincerely,

**Ricardo Lara** Insurance Commissioner California

# **KEY FINDINGS**

Extreme heat is not just a weather event, it's a silent, escalating disaster wreaking havoc on Californians' health, economy, and infrastructure. The California Department of Insurance's first extreme heat study, "Impacts of Extreme Heat to California's People, Infrastructure, and Economy"<sup>1</sup> exposes the hidden costs and impacts from multiple recent extreme heat events, painting a vivid picture of its devastating effects on communities statewide. This groundbreaking study showcases the staggering human impacts and costs in specific sectors of seven extreme heat events. The studied events encompass different regions and time periods in California over the past 5-10 years. The findings reveal the current reality of extreme heat events have far-reaching consequences, from increased mortality rates and adverse health outcomes to significant economic losses across various sectors. And this is just the beginning, as the scope and severity of the health and economic impacts in this study will increase with every projected increment of warming, shedding light on the urgent need for action to reduce the risks to vulnerable communities. Currently, the losses caused by extreme heat events, aside from a portion of those related to health, are generally not covered by insurance and most are borne by individuals and public entities. Traditional insurance does not cover the full spectrum of extreme heat-related losses, prompting a growing urgency to develop innovative insurance mechanisms. It's time to recognize extreme heat as a complex crisis demanding comprehensive solutions. Our study underscores the need for novel approaches, including financial resilience and insurance solutions, to protect communities, workers, and businesses. It's imperative that we prioritize resilience-building efforts, integrating climate-smart measures into our short and long-term planning to mitigate the growing impacts of extreme heat.

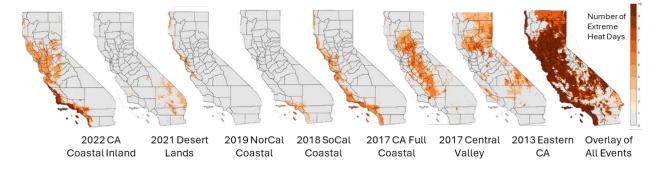


Figure 1. **Geographical Exposure of the Seven Past Extreme Heat Events**. Schematic representation depicting California geographical exposure maps for each of the seven studied past extreme heat events and an overlay map of all the events. Each event is named according to the year it occurred and the geographic regions it affected. The key indicates the color intensity, which corresponds to the number of extreme heat days experienced in each region.

<sup>&</sup>lt;sup>1</sup> This report was required by legislation sponsored by Insurance Commissioner Lara and signed into law in 2022. (Public Resources Code, section 81410(f).) In addition to performing this gap analysis, the report is intended to inform the development of an Extreme Heat Ranking System by the California Protection Agency. (Public Resources Code, section 71410(g).) In addition, the report implements two key extreme heat recommendations of the Climate Insurance Report of 2021, which was produced by the California Climate Insurance Working Group. That Working Group was convened by the Insurance Commissioner pursuant to state statute. (Insurance Code, section 12922.5.)

The report focuses specifically on seven extreme heat events in California and their impacts on multiple categories, including health and safety, economy, infrastructure, and energy (Figure 2). Key findings include:

- The total, cumulative cost of the seven heat events amounted to \$7.7 billion and together they affected nearly the entire population of California or around 12 times more people than the 7 most recent and deadliest wildfires, which impacted 3 million people.
- Adverse health outcomes disproportionately affected Black, Hispanic, and Native American communities, with premature deaths concentrated among older populations and emergency heat-related illnesses concentrated among younger populations.
- Most impacts were in the Health and Safety category, with nearly 460 deaths, nearly 344 adverse birth outcomes, more than 5,000 hospitalizations, nearly 10,600 emergency department visits, and more than 138,000 outpatient visits.
- For hospitalizations and emergency department visits, fewer than 30% had private insurance (less than 17% for hospitalizations), with Medicare and Medi-Cal covering 60-79% of these patients.
- Extreme heat decreased labor productivity, with lost work time valued between \$7.7 million and \$210 million per event. Lost wages are uninsured.

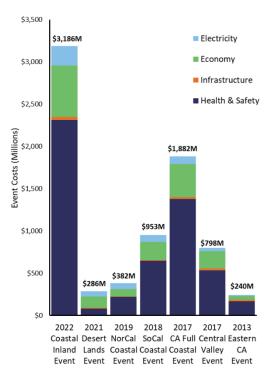


Figure 2. Quantified Costs by Category for the Seven Extreme Heat Events in 2022 dollars. A bar graph presenting the quantified costs by health and safety, electricity, economy, and infrastructure categories for the seven events.

- Across all examined economic measures, losses in the manufacturing sector were the largest, ranging from around \$3 million to \$300 million per event.
- Costs related to power outages were substantial. Of the seven heat events, the 2022 Coastal Inland event had the highest cost at \$230 million, due to affecting four of the most populous counties in the State.
- Infrastructure losses ranged from \$3.8 million to \$35 million per event, with road repair costs borne by government entities without the buffer of insurance.
- While the estimates of total impact are illuminating and startling, many impacts and costs cannot be quantified or fully estimated. A full accounting of the costs and physical effect incidence of these events is likely to be much higher than estimated in this study. See report for detailed description of methods and data sources.

### **HEALTH AND SAFETY IMPACTS**

High ambient temperatures can hinder the body's ability to cool itself, leading to severe acute and chronic health effects, including death.

- Premature mortality is the most significant cost of the seven extreme heat events, with social welfare losses ranging from \$77 million to \$2.2 billion per event, corresponding to 7 to 200 deaths per event (Figure 3).
- This study used a mortality valuation approach, similar to analyses conducted by other government agencies. Mortality valuation uses the value of statistical life (VSL) approach, commonly used in environmental and health risk analyses by organizations like the California Air Resources Board. The VSL in this study is \$11.2 million.
- The VSL represents the willingness to pay to avoid premature death based on Robinson and Hammitt, 2015, which is not comparable to the average individual life insurance payout of about \$160,000.

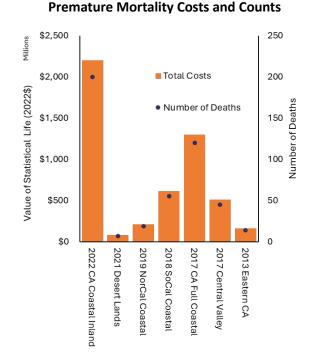
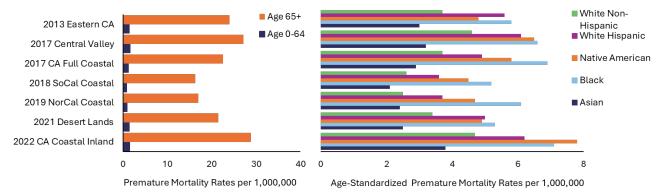


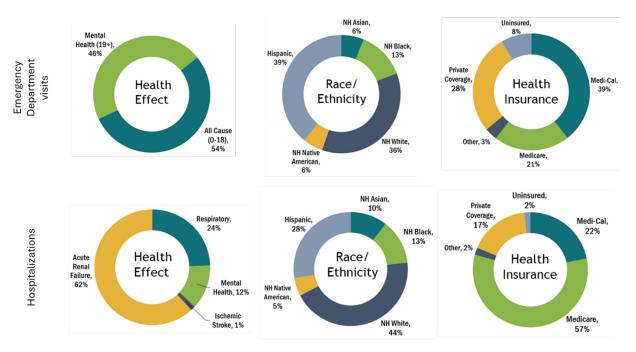
Figure 3. A dual-axis chart showing a bar graph of the value of statistical life of attributable premature mortality for seven extreme heat events, based on analysis derived from Rahman et al., 2022 (Y-axis on the left). The chart also includes dots representing counts of attributable premature mortality for each event (Y-axis on the right).



#### Premature Mortality Rates by Age and Race and Ethnicity

Figure 4. **Premature Mortality Rates by Age (left) and Race and Ethnicity (right) Attributable to the Selected Events.** Bar graph on the left shows mortality rates stratified by ages 0-64 and 65+. Bar graph on the right shows premature mortality rates for five subpopulations, age-standardized to the total state population. Race- and ethnicity-specific mortality rates focus on differential exposures by census tract and differences in baseline health status only.

 Most premature deaths are concentrated among older populations (65 years and above) (Figure 4, left). • Black, Native American, and White Hispanic mortality rates from extreme heat were higher in the seven extreme heat events studied than for Asian and White Non-Hispanic populations (Figure 4, right).



#### Distribution of Excess Emergency Department Visit and Hospitalization Outcomes

Figure 5. Distribution of Excess Emergency Department Visit (top) and Hospitalization (bottom) Outcomes by Effect Type (left), Race and Ethnicity (center), and Health Insurance Coverage (right) for the 2022 CA Coastal Inland Event. Top donut graphs show the distribution of Emergency Department Visit impact estimates for Effect Type, Race/Ethnicity, and Health Insurance Coverage. Similarly, bottom donut graphs show the distribution of Hospitalization impact estimates. The Race/Ethnicity and Health Insurance panels make use of county-specific individual incidence data, so reflect the combined effect of sensitivity and exposure on racial and ethnic groups, and for insurance types.

Extreme heat events increase emergency department visits and hospitalizations for conditions like kidney failure, respiratory issues, mental health, and stroke, affecting both adults and children.

- For the extreme heat events studied, the results show nearly 10,600 Emergency Department (ED) visits, over 5,000 hospitalizations, and more than 138,000 outpatient visits<sup>2</sup>, with hospitalizations ranging from 60 to 2,132, ED visits from 126 to 4,280, and outpatient visits from 2,400 to 55,000 per event.
- Emergency Department visit costs are roughly equally split between adult mental health and child all-cause categories, while most hospitalizations are for acute renal failure (Figure 5, left panel).

<sup>&</sup>lt;sup>2</sup> The data used to estimate the number of outpatient visits are from Medi-Cal and MediCare claims only, and therefore omit visits among individuals with private or no health insurance, the estimated number of visits likely underestimate the total incurred during those events.

- Adverse health outcomes disproportionately affect Black, Hispanic, and Native American communities (Figure 5, center panel).
- An analysis of insurance data from the study events showed a higher proportion of Emergency Department visits were covered by Medi-Cal due to the incidence among young populations (Figure 5, right panel).
- Only a small portion of the total hospitalized (17 percent) had private insurance coverage, much lower than the overall private insurance rates throughout the state; most of those hospitalized had either Medicare (57 percent) or Medi-Cal (22 percent).

\$8

Extreme heat is linked with several adverse birth-related outcomes, including gestational diabetes for expectant mothers, preterm births and cases of low birth weight for newborns, and stillbirths.

- In total, nearly 344 cases of adverse pregnancy or birth-related outcomes are associated with the extreme heat events studied, with roughly equal numbers of gestational diabetes cases and adverse birth outcomes.
- The associated medical expenditures for these additional birth-related outcomes range from \$200,000 to \$6,700,000 per event (Figure 6).
- These costs are paid for by a mix of private and public health insurance plans, as well as out-of-pocket expenditures.

#### Millions Total Costs Cases of Low Birth Weight \$7 70 O Cases of Preterm Birth Cases of Gestational Diabetes 60 \$6 Cases of Stillbirth Total Costs (2023\$ \$5 20 40 05 Number of Cases \$4 \$3 \$2 20 \$1 10 \$0 2019 2018 2017 2017 2013 2022 2021 CA Desert NorCal SoCal CA Full Central Fastern Coastal Lands CoastalCoastalCoastal Valley CA Inland

#### **Birth-Related Outcomes**

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Figure 6. A dual-axis chart showing a bar graph representing the total costs of attributable birth-related outcomes (among women ages 16-49) for seven extreme heat events (Y-axis on the left). Cases of stillbirths are not valued due to lack of information in the literature. The chart also includes dots representing counts of attributable cases of quantified birth-related outcomes for each event (Y-axis on the right).

## LABOR PRODUCTIVITY IMPACTS

Weather-exposed workers spend less time working on hot days, which has the potential to decrease take home pay, disrupting expected income for workers and businesses, and causing impacts for the entire sector productivity, with downstream consequences for workers in adjacent professions.

- Reduced labor participation is one avenue through which industries may see reduced output and workers may experience reductions in wages.
- Across the heat events, the total lost work time among these workers is valued between \$7.7 million and \$210 million per event. Figure 7 shows the regions where more than \$140 million wages were lost during 2017 CA Full Coastal Event.
- Impacts on vulnerable subpopulations are not quantified – but literature suggests that reductions in labor hours during extreme heat fall disproportionately among low-income populations.
- Importantly, the estimates presented here only include how workers reduce their worktime on hot days; workers are additionally harmed through increased prevalence of heat-related illness and workplace injuries.

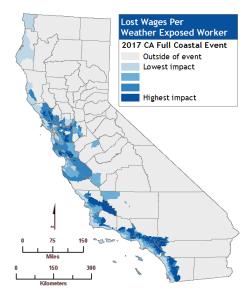


Figure 7. Lost Wages in Weather-Exposed Industries for the 2017 CA Full Coastal Event. A map of California showing the areas impacted by a reduction in wages to weather-exposed workers from reduced labor participation during high heat days using evidence from Neidell et al. 2021. Lost work time is valued using sector-specific average wage hourly rates. The key indicates the color intensity, which corresponds to the level of impact experienced in each region.

Impacts of Extreme Heat: Key Findings and Recommendations

# **ECONOMIC IMPACTS**

Extreme heat events can reduce economic output across various sectors exposed to high temperatures and humidity.

> The study estimates impacts to dairy and crop agriculture; industry productivity losses and dairy cow mortality; manufacturing productivity losses due to indoor places of work lacking air conditioning; reductions in time spent working in weatherexposed industries (monetized using lost wages); and business revenue losses due to consumers altering their behavior to avoid extreme heat conditions.

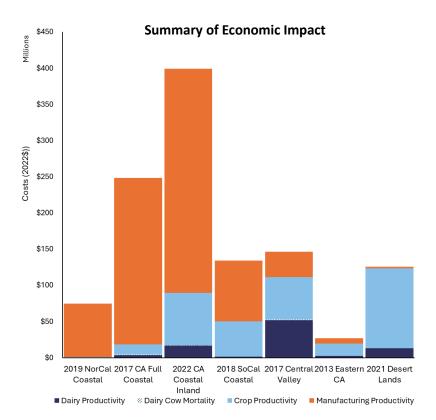


Figure 8. A bar graph showing the total attributable losses across the Dairy Productivity, Dairy Cow Mortality, Crop Productivity, and Manufacturing Productivity categories for seven extreme heat events.

- The manufacturing sector experiences the largest losses, though estimates have some measurement errors and uncertainty.
- The 2022 Coastal Inland event had the highest combined costs, while the 2017 Central Valley event saw the greatest losses in dairy productivity and cow mortality due to its impact on agricultural regions (Figure 8).
- Insurance policies maintained by manufacturing companies to protect against significant revenue losses are unlikely to include heat as a covered peril.
- The Federal government and a limited number of private insurers insure crop agriculture losses, but protection gaps remain for extreme heat-driven losses, especially for specialty crops that dominate California's agricultural economy and that are not covered by the Federal Crop Insurance Program.
- For dairy productivity, USDA's Dairy Revenue Protection program has been in effect since 2018, with subsidized premiums, and heat is a covered peril.

### **ELECTRICITY IMPACTS**

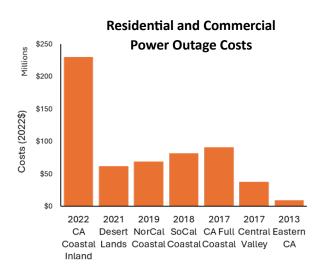
Many households, small businesses, farms and ranches, and manufacturing processes rely on electricity more and more for the fundamental activities in their everyday work and life. The economic impacts of extreme heat to these fundamentals can be acute – electrical shutdowns in areas for a short period of time could close businesses or spoil food and medicine.

- Extreme heat affects energy systems by decreasing the carrying capacity of transmission lines and reducing the efficiency of generators, while increasing electricity demand for cooling. These factors can compound, leading to more frequent and severe power outages.
- Major impacts were felt in populous counties like Santa Clara, Los Angeles, San Francisco, and San Diego, driving up cost estimates. The 2022 CA Coastal Inland heat event was particularly costly due to outages in these counties (Figure 9, Top).
- Business interruption insurance often excludes extreme heat or is triggered by physical damage, leaving most costs uncovered. Property insurance may apply if outages cause physical damage.
- To prevent outages, California ISO issues Flex Alerts, asking users to conserve energy during peak periods.
  The number of Flex Alerts has increased, with 46% of all alerts during the study period occurring in six of the seven events analyzed (Figure 9, Bottom).



Extreme heat is not only dangerous for human health, but has specific physical impacts to infrastructure and buildings, precipitating widespread financial risks to the economy and public services.

- Extreme heat deforms infrastructure components, such as rails and road surfaces. Rails can deform, leading to speed restrictions, delays, and repairs, while roads soften and develop ruts, reducing their lifespan and requiring more frequent resurfacing.
- Heat impacts disproportionately affect low-income and vulnerable populations, who spend more of their income on transportation. Road and rails costs include both repair costs (incurred by governments) and delay costs (incurred by all road users).



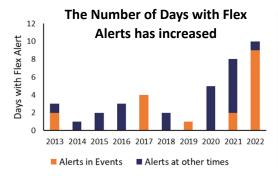
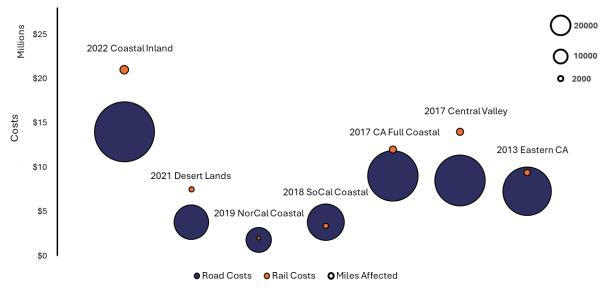


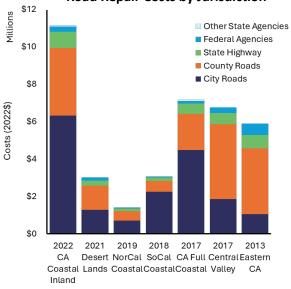
Figure 9. **Top:** A bar graph showing the total attributable cost of residential and commercial power outages across for seven extreme heat events. **Bottom:** A bar graph showing the number of days annually with Flex Alerts within and outside the scope of the studied extreme heat events.



**Road and Rail Costs and Miles Affected** 

Figure 10. A bubble chart illustrating the costs per mile for road and rail losses following seven extreme heat events. The y-axis shows the costs, with blue bubbles representing road costs and orange bubbles representing rail costs. The size of each bubble corresponds to the number of miles affected, highlighting that rail costs were higher per mile compared to road costs.

- Due to the 2021 Desert Lands event, extreme heat in San Bernardino County caused over half of the total rails costs (\$4.8 million of \$7.5 million), mainly affecting freight and commuter rail systems (Figure 10).
- Data on insurance coverage is sparse. More than 95% of rail impacts are due to delays rather than repairs, with passenger delays uninsured and some freight delays potentially covered by business interruption insurance.
- Cities and counties bear most of the costs of road repair though the distribution between those entities varies by event (driven by the geography and road network of the affected area) (Figure 11).



**Road Repair Costs by Jurisdiction** 

Figure 11. A bar graph showing the costs to governments of road repair for seven extreme heat events, derived from analysis of a published study (Neumann et al. 2021). Total repair costs attributed to jurisdictions based on number of road miles maintained.

# RECOMMENDATIONS

The core goal of this study is to show how extreme heat events have far-reaching consequences, from increased mortality rates and adverse health outcomes to significant economic losses across various sectors. It's time to recognize extreme heat as a complex crisis demanding comprehensive solutions. Even with small increments of further warming, the scope and severity of the health and economic impacts will <u>increase</u>. This is not the first report on the dangers of extreme heat. It is, however, the first to link specific financial risks and losses to recent extreme heat events, and therefore illustrates some, but not nearly all, the financial and human impacts of extreme heat events to Californians.

The following recommendations are motivated by the findings of this report and would demonstrate important steps for federal, state, and local governments, healthcare providers, businesses, and insurance companies to implement in order to enhance resilience against extreme heat events. These strategies aim to protect public health, support economic stability, and improve infrastructure while leveraging public and private sector investments.

It is essential to implement mitigation and adaptation strategies that limit greenhouse gas emissions to keep global temperature rise below 1.5 degrees Celsius, helping to reduce the frequency and severity of extreme heat events beyond 2050. These strategies should be developed through conducting thorough risk assessments, involving local communities in planning, considering long-term sustainability, and ensuring that adaptation measures are equitable and environmentally sound to avoid making policy decisions that leave people behind or encourage adaptation measures that are more harmful than helpful.

**<u>Recommendation 1:</u>** Communicate the data in this report to foster cross-jurisdictional engagement between state and local governments, and as a source of information for agencies looking to invest in and test specific interventions, risk reduction programs, and community grant opportunities.

**Communicate the results of the study directly with local, state, and federal government agencies and the public:** Because the seven extreme heat events were chosen to be representative of the geographic and population density differences in the state, the costs detailed in this report are relevant to planning and preparation for local governments, and can inform federal and state priorities for providing local-assistance grants to close protection gaps.

More specifically, the health impact findings, including hospitalizations, emergency department visits, and outpatient visits, will help inform the implementation of the California Extreme Heat Ranking System. For instance, among the three studied types of healthcare delivery, outpatient care or urgent care clinics experienced the most significant increase in patient numbers during extreme heat events. This insight could inform resource allocation for outpatient clinics and enable targeted messaging to patients who rely on their services.

Financial risk information, including insurance data, can improve the effectiveness of adaptation programs and ultimately greater protection for communities. Having the foundational evidence from the seven extreme heat events described and studied in this report, the California Department of Insurance and other research groups can go further in examining more specific impacts and costs of extreme heat on vulnerable populations and economic sectors (see Areas for Further Research section in report).

**<u>Recommendation 2</u>**: Address the disaster impacts of extreme heat events by expanding investment in predisaster adaptation measures and insurance solutions to enhance overall resilience and improve health outcomes.

Leverage Existing Resilience Funding to Address Future Extreme Heat Event Impacts: Extreme heat health and safety, infrastructure, and economic impacts are often interlinked. For example, ensuring reliable electricity and well-maintained roads supports healthcare delivery, enabling timely access to medical facilities and services during heat events.

Our study underscores the need for novel approaches to protect communities, workers, and businesses. It's imperative that we prioritize resilience-building efforts, integrating climate-smart measures into our short and long-term planning to mitigate the impacts of extreme heat. Some of these goals align with current federal and state disaster and climate resilience funding.

- Federal funding established in the Bipartisan Infrastructure Law and Inflation Reduction Act has secured more than \$50 billion in funding for climate resilience and adaptation measures. These include:
  - Funding projects that will strengthen surface transportation systems against extreme weather events so that people can access cooling locations.
  - Funding projects to bolster electric grid resilience across the country and funding research to develop the latest <u>energy-storage technologies</u>.
  - Funding to restore forests and urban greenspaces. For example, the U.S. Forest Service's Urban and Community Forestry Program announced \$1 billion in grants to expand equitable access to trees and green spaces.
  - o Funding resilient and climate-smart agriculture and water infrastructure.
- In California, the state has ongoing and one-time grant programs supporting climate mitigation, adaptation, and resiliency, such as:
  - o Extreme Heat and Community Resilience Program
  - o <u>Tribal Nature-Based Solutions Program</u>
  - o The Urban and Community Forestry Grant Program
  - o <u>Transformative Climate Communities Program</u>

Public and Private Sector collaborations on short- and long-term Heat-Illness Reduction Strategies: Public and private health insurance programs can support initiatives that fund, for example, tree planting and the installation of updates to homes to reflex heat or improve insulation, ultimately reducing heat-related health claims and improving public health outcomes.

**<u>Recommendation 3:</u>** Encourage heat-illness reduction strategies across economic sectors to reduce heatrelated illnesses and injuries to the wide range of workers facing impacts and to stabilize financial risks that stem from heat disruptions. Extreme Heat events threaten workers in many professions and disrupt businesses and supply chains. A <u>2021</u> <u>study</u> estimates the annual rate of heat-related injuries at 20,000, which is at least nineteen times higher than the number reported and medically coded for heat exposure in California's Worker's Compensation System. Additionally, our study reveals that coverage for non-physical damage business interruption due to extreme heat is very limited or nonexistent.

**Incentivize Heat-Illness Reduction Strategies:** Insurance companies and state programs should explore premium incentives for businesses that implement heat-illness reduction strategies and meet benchmarks above the minimum indoor and outdoor temperature standards set by local, state, and federal governments. For example, the New York State Insurance Fund developed the <u>climate action premium credit pilot program</u> to help hospital system policyholders reduce emissions, enhance system resilience, and improve worker safety.

**Explore Innovative Insurance Solutions:** Businesses, healthcare providers, and governments should explore insurance products that cover business interruptions, infrastructure and agricultural damages, and emergency services during extreme heat events, ensuring that local governments can provide essential and urgent disaster services to their residents and healthcare providers can recover more quickly from extreme heat disasters that disrupt healthcare delivery to patients.

**Develop Adaptation Plans and Continuity Strategies:** Farms, ranches, and businesses should include extreme heat as a core component of adaptation plans, including continuity strategies during extreme heat events to ensure the sustainability of their operations and the safety of their working conditions. Such strategies and components could include installing climate-smart energy-efficient cooling systems, implementing flexible work hours to reduce heat exposure during peak temperatures, and installing decentralized renewable power sources.

**Incentivize Extreme Heat Resilient Strategies:** Federal insurance programs should consider incentivizing extreme heat resilient strategies by providing premium incentives through the Federal Crop Insurance Program and the USDA's Dairy Revenue Protection programs. <u>Other types of adaptation incentives</u> have already been deployed by the USDA. Private crop insurers that cover a small number of specialty crops in California, should also incentivize risk reduction.

**<u>Recommendation 4</u>**: Utilize examples from the local government case studies to inform future state and local planning and mitigation policies.

In Spring 2024, CDI deployed a survey to collect basic quantitative and qualitative information on the costs and expenses related to extreme heat events incurred by local governments across California in the past four years. The responses to the survey included county and city level information, including information on the impacts of extreme heat events on operations, current and future extreme heat emergency services and plans, and long-term extreme heat adaptation planning. Out of the 18 local government responses, 10 local jurisdictions collectively declared 35 extreme heat event warnings in the past four years, an average of 8 events per year, highlighting the pervasive exposure to extreme heat. Based on the results of the Survey, specific action areas include:

**Enhance Tracking of Operational Costs to Improve Planning:** Improve the tracking of operational costs related to extreme heat to better inform resource allocation and funding decisions.

Only six counties responded that they have incurred some added costs to their basic operations due to extreme heat events. These added costs include electric bills (5), use of backup generators (4), wear and tear of public infrastructure (4), increase in the number of emergency services (3), increase in visits to community health clinics (2), increase in hospital bed days (2), staff overtime at cooling centers (2), resources (2), and security (2). Five out of 17 counties that responded tracked annual added costs due to extreme heat events. These added costs are <u>not</u> comprehensive and range between \$2344 to \$2,066,580<sup>3</sup> in 2022.

**Promote Equity in Extreme Heat Adaptation** 

**Planning:** Ensure that adaptation strategies consider the needs of vulnerable populations, including elderly individuals living alone, women, LGBTQ+ individuals, outdoor and indoor workers, people with disabilities, and those without lifesupporting resources, to promote equitable resilience.

Six counties stated that they are planning on establishing extreme heat adaptation measures or programs to reinforce social and health services. These include educational and training sessions for local social service providers, for local health service providers, and for healthcare providers,

### EXAMPLE OF ELEVATED PRESSURE ON LOCAL BUDGETS: ADDITIONAL CALLS FOR EMERGENCY MEDICAL SERVICES

Per LA County Fire, each of the major heat risk (level 3) days as classified by the National Weather Service caused an estimated 115 additional calls for emergency medical services, and each of the extreme heat risk (level 4) days 152 additional calls compared to matched days with no or minimal heat risk.

increasing capacity of emergency services, and establishing a volunteer program to support social and health services.

**Increase Specific Financial Assistance to Address Local Costs:** Develop and expand federal and state funding opportunities for extreme heat recovery measures and adaptation planning to encourage counties to apply for assistance and grant programs.

Madera County applied for assistance through the California Disaster Assistance Act Program to cover costs incurred due to a declared wildfire emergency following an extreme heat event in 2022. This illustrates the compounding impact of extreme heat on other disasters and underscores the need for assistance for integrated disaster preparedness and response strategies to manage the cascading effects of extreme heat on other natural disasters.

**Test Innovative Insurance Pilot Projects:** Design and test insurance solutions that provide critical financial support to local governments, ensuring more comprehensive coverage and quicker recovery from heat-related losses. These insurance mechanisms could offer dual benefits: (1) Risk reduction and loss prevention by incentivizing resilience measures and covering preparedness costs, not just post-event losses; and (2) Rapid financial support through coverage of expenses and losses, facilitating swift and efficient recovery.

<sup>&</sup>lt;sup>3</sup> This figure is for LA County Fire alone.