



# Energy Safety Net Toolkit

## TOOL #5

### WHEN WEATHER KILLS: HEAT RESPONSE PLANS AND THE LOW-INCOME NEED FOR HOME COOLING

Prepared For:

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While much of the attention relating to home energy assistance today is directed towards the dangers of cold weather, extreme heat<sup>1</sup> is the most deadly weather that consumers face. As a result, additional attention should be paid not only to the dangers associated with extreme heat, but also to addressing the particular problems attributable to an inability-to-pay for the cooling necessary to provide health and safety protections. The discussion below documents the health and safety problems facing low-income consumers in hot weather and introduces the “heat response plan” as a local mechanism to help address those problems.

#### THE IMPACT OF HOT WEATHER ON HEALTH AND SAFETY

Intense heat is the most dangerous extreme weather condition facing low-income Americans when measured in terms of individual deaths and injuries. According to the National Weather Service, during the ten years 1989 through 1998, heat-related deaths outpaced fatalities attributable to every other severe weather category.<sup>2</sup> The Weather Service reports:

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<sup>1</sup> “Extreme heat days” are defined as those during which the daily average heat index value (based on temperature and humidity) exceeds the summertime (July-August) 85<sup>th</sup> percentile at a given location. “Extreme heat nights” are occurrences when the daily minimum heat index value exceeds the local 85<sup>th</sup> percentile. Kert Davies (July 2000). *Heat Waves and Hot Nights*, at 2, Physicians for Social Responsibility: Washington D.C.

<sup>2</sup> U.S. Center for Disease Control, *Summer Forecast Hot! NOAA, CDC Work to Save Lives From Potentially Deadly Heat*, at 2, NOAA Release 2000-058 (June 20, 2000). Of course, state utility commission regulations that restrict the disconnection of utility service during cold weather months are ubiquitous, even if not universal. The 1990 *Annual LIHEAP Report to Congress* presented a national survey of the type, and the extent, of winter utility shutoff restrictions. U.S. Department of Health and Human Services, Administration for Children and Families, Office of Community Services, Division of Energy Assistance (September 1991). *Low Income Home Energy Assistance Program, Report to Congress for Fiscal Year 1990*, at 153 – 162, Department of Health and Human Services: Washington D.C. It is possible that a shutoff moratorium during extreme heat would serve the same function in protecting lives.

For example, based on this 10-year average, hurricanes killed 14 people annually, tornadoes claimed 57 lives, and lightning strikes and floods killed 58 and 99 people respectively. Excessive heat, however, killed an average of 193 in the same time period. In 1999, there were 497 heat-related deaths.<sup>3</sup>

As the table below shows, deaths and injuries from extreme hot weather are far greater than deaths and injuries from extreme cold.<sup>4</sup> Indeed, extreme heat was the #1 weather-related killer in each year 1998 through 2000.<sup>5</sup>

Summary of Weather Event Fatalities, Injuries and Damage Costs (1998 – 2000)						
Extreme Temperatures <sup>6</sup>						
	1998		1999		2000	
	Fatalities	Injuries	Fatalities	Injuries	Fatalities	Injuries
Extreme cold	11	27	7	32	26	0
Extreme heat	173	673	502	1,477	158	469

Because of these heat-related dangers, and the role which low-income inability-to-pay plays in exacerbating these dangers, it is appropriate for fuel funds, as well as public utilities, to participate in devising, advocating for, and implementing community protections.

### ***Households Most at Risk***

Seniors living at home are most at risk of heat-related fatalities. In 2000, for example, persons aged 60 and older accounted for 68% of heat-related deaths; persons aged 70 to 89 accounted for 45% of heat-induced fatalities. Similarly, in 1999, persons aged 70 to 89 accounted for 47% of all heat deaths.

Heat-Related Fatalities by Year and Age (Number and Percent) <sup>7</sup>						
Age in Years	1998		1999		2000	
	Number	Percent	Number	Percent	Number	Percent
0 – 9	6	3%	5	1%	4	3%
10 – 19	4	2%	1	0%	2	1%
20 – 29	1	1%	5	1%	5	3%
30 – 39	10	6%	17	3%	8	5%
40 – 49	16	9%	52	10%	14	9%
50 – 59	16	9%	65	13%	16	10%
60 – 69	22	13%	75	15%	29	18%
70 – 79	44	25%	133	26%	39	25%
80 – 89	43	25%	106	21%	32	20%
90+	8	5%	23	5%	8	5%
Unknown	3	2%	20	4%	1	1%
Total	173	100%	502	99%	158	100%

<sup>3</sup>

*Id.*

<sup>4</sup>

National Weather Service, *Summary of Natural Hazard Statistics for 2000 in the United States*, at 2.

<sup>5</sup>

The Office of Climate, Water and Weather Services, of the National Weather Service, publishes the number of deaths attributable to severe weather at the following World Wide Web site: <http://205.156.54.206/om/hazstats.shtml>.

<sup>6</sup>

National Weather Service, *Summary of Natural Hazard Statistics in the United States* (annual, 1998 – 2000).

<sup>7</sup>

Office of Climate, Water and Weather Services, National Weather Service, *Heat-Related Fatalities by Age and Gender* (annual).

Most of these deaths occurred at home. In 2000, nearly seven out of every ten heat-related deaths (107 out of 158) occurred in permanent homes without air conditioning or adequate ventilation. In 1999, 385 of the 502 heat-related fatalities occurred in the home.<sup>8</sup>

### ***Low-Income Status as Risk Factor***

Low-income status significantly contributes to heat fatalities as well. The National Weather Service has referred to “what appears to be a cruel economic side to heat wave fatalities.”<sup>9</sup> The majority of those who died in the 1999 heat wave, for example, “were elderly persons living alone in the inner city regions, and either were without air conditioning or without the funds to pay for continuous operation of their air conditioning units.”<sup>10</sup> Tenements that house low-income households in large cities are particularly ill-suited for extremely hot weather.<sup>11</sup> So, too, do older-style mobile homes that lack air conditioning present dangerous situations.

Heat poses a particular problem to the poor because the poor cannot afford the cooling necessary to protect health and safety. The unaffordability of home cooling bills has been well documented. One study concluded that “summer electric bills impose a tremendous and unaffordable burden on low-income households who receive federal fuel assistance.”<sup>12</sup> The study found that of the 185 electric utilities studied, at a consumption of 1,000 kWh per month, summer electric burdens (bills as a percentage of income) were:

- equal to or in excess of 20% of income for LIHEAP recipients for 37 companies; an additional 66 companies saw a summer electric burden of between 15% and 20% of income.
- equal to or in excess of 30% of income for public assistance recipients for 69 companies, with an additional 102 companies imposing a burden of between 15% and 30% of income.<sup>13</sup>

One reason low-income status is a risk factor, also, is because of the particular dangers in large urban areas with their high concentrations of low-income households. Heat waves hitting large Midwestern urban areas in 1999<sup>14</sup> were compounded by clear skies, “allowing intense solar

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<sup>8</sup> Office of Climate, Water and Weather Services, National Weather Service, *Heat Related Fatalities by State and Location* (annual).

<sup>9</sup> NOAA, *Heat Wave: A Major Summer Killer*, at 5 (June 2001).

<sup>10</sup> *Id.*

<sup>11</sup> Nick Sundt (1995). *Summer Heat Waves Take Heavy Toll from Urban Poor: Deaths Underline Health Threat from Climate Change*, in *Global Change (electronic edition)* Pacific Institute for Studies in Development, Environment and Security: (Oakland, CA). This report can be found at the following Web page: <http://www.globalchange.org/impactal/95oct15d.htm>

<sup>12</sup> Michael Sheehan and Roger Colton (1994). *The Other Part of the Year: Low-Income Households and their Need for Cooling: A State-by-State Analysis of Low-Income Summer Electric Bills*, at 124, Flying Pencil Publishing: Portland (OR).

<sup>13</sup> *Id.*, at 125.

<sup>14</sup> While much has been written of the 1999 Midwestern heat wave, statistics from the National Weather Service make clear that heat-induced fatalities are *not* simply a Midwestern urban phenomenon. Of the 158 extreme heat fatalities in 2000, the top six states suffering fatalities included: Texas (71), Pennsylvania (17), Missouri (17), Mississippi (16), California (12) and Louisiana (12). National Weather Service, *2000 Heat Related Fatalities, Heat Related Fatalities by State and Location*. This publication can be found at the following WWW address: [http://www.nws.noaa.gov/om/severe\\_weather/heat00.pdf](http://www.nws.noaa.gov/om/severe_weather/heat00.pdf).

radiation to literally turn closed homes and apartments into brick ovens.”<sup>15</sup> Most of the people who died in the 1999 Midwestern heat wave “lived in large cities with an old infrastructure of non-air-conditioned brick buildings.”<sup>16</sup>

The problems faced by low-income households are exacerbated even further by the “urban heat island” effect. This effect refers to the higher temperatures in urban areas due to the concrete cover and lack of vegetation. The urban heat island effect amplifies temperatures by between three and five degrees Fahrenheit or more.<sup>17</sup> Even “larger temperature differences occur in the late afternoon and early evening, as the city sustains its peak heat level long after the more rural location is cooling down.”<sup>18</sup>

In addition to the hot weather itself, the weather conditions that *accompany* heat are dangerous to low-income households. Though labeled “less dramatic” than the health problems arising from the heat itself, adverse impacts also result from air quality deterioration associated with heat waves. “The American Lung Association reported in late July (1995) that peak ozone levels in 11 states had reached marks at least 40% beyond levels accepted under current air quality standards. Additional lesser violations occurred in these and 17 other states.”<sup>19</sup> Bad air quality forces people inside where the lack of air-conditioning can quickly become deadly.

### ***Air Conditioning as Risk Mitigation***

According to the Center for Disease Control, “air conditioning is the number-one protective factor against heat-related illness and death.”<sup>20</sup> Not even electric fans provide protection against heat-related illness:

Electric fans may provide comfort, but when the temperature is in the high 90s, fans will not prevent heat-related illness. Taking a cool shower or bath or moving to an air-conditioned place is a much better way to cool off. Air conditioning is the strongest protective factor against heat-related illness. Exposure to air conditioning for even a few hours a day will reduce the risk for heat-related illness.<sup>21</sup>

One study concluded flatly that air-conditioning<sup>22</sup> has the effect of reducing heat-related mortality in U.S. cities. In New York City alone, for example, 21% of all heat-related deaths that occurred between 1964 and 1988 could have been avoided by air conditioning.<sup>23</sup>

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<sup>15</sup> Major Summer Killer, *supra*, at 5

<sup>16</sup> *Id.*

<sup>17</sup> *Id.*, at 6

<sup>18</sup> *Id.*

<sup>19</sup> *Id.*

<sup>20</sup> Center for Disease Control (2001). *Extreme Heat: Fear of High Utility Bills Could Worsen Heat-Related Illness this Summer*, at 1.

<sup>21</sup> *Id.*, at 9

<sup>22</sup> “Air conditioning” includes only fans that are attached to some type of refrigeration unit. It does not encompass, for example, the use of evaporative coolers, or swamp coolers. Moreover, swamp cooling is most effective only in areas (and at times) when temperatures are warm and humidity is low. Evaporative coolers are of particular use in climates, such as the Southwest, which have severe humidity fewer than four to five weeks a summer.

<sup>23</sup> Laurence Kalkstein, “Health and Climate Change: Direct Impacts in Cities,” *Lancet*, 342:1397-1399, 1398 (1993).

In sum, the deadly nature of hot weather clearly gives rise to the need to pay particular attention to the cooling needs of low-income households. Low-income status has been found to be a particular risk factor *vis a vis* health and safety in hot weather. Not only are low-income households less likely to have the funds to pay for the costs of home cooling needed to ensure safety, but they tend to live in homes that are more dangerous as well. Even though air-conditioning is the best protection against heat-related dangers, with summer electric burdens of 20% or more, cooling is simply beyond the ability-to-pay of many low-income households.

### A COMMUNITY “HEAT RESPONSE PLAN”

One strategy that local fuel funds should promote to protect low-income and elderly households is the development of a written community “heat response plan.”<sup>24</sup> A heat response plan would detail what specific steps the various parts of a community would undertake when the plan is triggered by a National Weather Service bulletin relating to extreme heat.<sup>25</sup>

The Milwaukee (WI) “heat response plan” is a model which other communities can and should emulate.<sup>26</sup> The actions taken under the heat response plan are tied to one of three “heat action thresholds” announced by the National Weather Service. In ascending levels of severity, the thresholds are:

- A Heat Health Outlook
- A Heat Health Watch
- A Heat Health Warning

Recent research has suggested that cities that issue heat wave warnings should consider activating such a system when average daily temperatures over a five-day period reach 75° Fahrenheit, particularly when these temperatures are reached early in the heating season.<sup>27</sup> According to this London research, especially hot days early in the summer season (in May or June) seem to have a more dire impact on health and mortality than similarly hot days in July and August.<sup>28</sup>

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<sup>24</sup> Some cities already have emergency crisis management plans. A fuel fund should first determine whether the municipality has such a plan in place and, if so, how the fund might best contribute to community protections. The first place of inquiry about such a plan should be the local department of health.

<sup>25</sup> “Because heat-related morbidity and mortality could increase with more periods of extreme heat in future summers, many cities have developed heat emergency response plans. These response plans use information on risk factors and meteorological information to implement prevention strategies that reduce morbidity and mortality from excessive heat.” Center for Disease Control. “Heat-Related Deaths – Los Angeles County, California, 1999 – 2000, and United States, 1979-1998,” *Morbidity and Mortality Weekly Report*, 50(29):623-626 (June 27, 2001).

<sup>26</sup> The Milwaukee *Plan for Extreme Heat Conditions 2001*, adopted by the Milwaukee Health Department, can be accessed at: [http://www.ci.mil.wi.us/citygov/health/heat/plan\\_for\\_extreme\\_heat\\_conditions.htm](http://www.ci.mil.wi.us/citygov/health/heat/plan_for_extreme_heat_conditions.htm).

<sup>27</sup> Shakoor Hajat, et al. (May 2002). “Impact of Hot Temperatures on Death in London”. *Journal of Epidemiology and Community Health*, 56:367-372.

<sup>28</sup> The research found that later in the season, the death toll appears to rise after prolonged periods of heat. *Id.*

## *The Components of a Plan*

A Heat Response Plan consists of four key elements.

- 1) **Identification of high risk persons:** Certain populations of persons exhibit patterns of death and injury from excessive heat. Persons falling into these categories may be identified ahead of time so that special efforts may be used to provide protections. High risk individuals include, but are not limited to, the elderly, physically disabled persons, chronically ill persons, mentally ill (or cognitively impaired) persons, infants and the obese. Communities should consider the creation of an Extreme Weather Registry. Through such a registry, a community would create and maintain a log of high risk individuals. A community-based organization would then arrange for regular check-ins by family and friends, or by community members, during extreme-heat weather emergencies.
- 2) **Outreach and education:** Community education should raise the public’s awareness of the “heat index” to the same level of awareness as the “wind chill” factor. The “heat index” combines data on temperature and humidity to capture the dangers of extreme heat. Education should also promote knowledge of the Extreme Weather Registry as well as the availability of the Community Hot Line and the Congregate Cooling Facilities. Outreach and education should promote those actions that an individual might take at home to promote health and safety during extreme hot weather.<sup>29</sup>
- 3) **Access to cooling:** During either the Heat Health Watch or Heat Health Warning, the Milwaukee plan states: “individuals must be able to access information regarding cooling options, depending on their mobility and general state of health.”<sup>30</sup> The Milwaukee Plan provides that:
  - Persons of limited mobility or chronic illness, who may not tolerate out-of-doors travel, will require “access to assessment for risk to safety” and delivery of “home cooling strategies.”
  - Persons with greater mobility “must be able to learn where to go to obtain air conditioning in congregate facilities that are near their homes.” Congregate cooling facilities are facilities that may be used by the community to obtain cooling. They may include locations such as libraries, malls, churches, office buildings, and the like.
  - “Extraordinary needs may require establishment of extended-hour cooling sites through the use of emergency shelter workers . . .or other resources for local needs (e.g., air conditioned public transit buses).”

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<sup>29</sup> Home-based actions might include everything from taking cool baths to hanging shades and other covering over windows to keep the sun out.

<sup>30</sup> *Plan For Extreme Heat*, Milwaukee (WI) (July 2001).

- 4) **Heat-related assistance:** Community members need access to a heat emergency hot line. This hot line should provide authoritative information about everything from where congregate cooling facilities are located, to what in-home cooling strategies can and should be used, to where individuals can seek immediate medical attention for heat-related emergencies. One important attribute of a community hot line is its guaranteed availability, even during non-business hours.

### ***The Role of a Fuel Fund***

While the Milwaukee Heat Response Plan uses the Milwaukee Health Department as its primary administering agency, the *initiative* to formulate a Heat Response Plan need not rest exclusively with the local health department. A local fuel fund can play several important roles:

- A fuel fund (in collaboration with the local electric utility) could serve as the primary advocate to create a local Heat Response Plan. A proposal developed and advanced to a local Town Council, for example, could easily be the joint work-product of a local fuel fund and a partnering utility.
- A local fuel fund could serve as the location of the Extreme Weather Registry. This would involve keeping records of persons enrolled in the Registry and coordinating the daily check-in with these persons during heat-related emergencies.
- A local fuel fund could serve as the coordinator of the community's congregate cooling sites. This would involve making contacts with facility managers to gain commitments for facility use during heat emergencies. It would involve notifying those managers of the declaration of such an emergency and coordinating access, including after-hour access where necessary.
- A local fuel fund could deliver education to particularly vulnerable populations. Whether those individuals are low-income generally, or specific sub-groups (such as the elderly or disabled), education should be directed toward issues such as in-home heat preparedness as well as the health hazards of extreme heat. Education about the three different levels of heat emergencies is necessary as well.
- A local fuel fund could deliver outreach to vulnerable populations, seeking, for example, to ensure that households needing such services enroll in the Extreme Heat Registry. Outreach would also include community education as to the existence and role of congregate cooling facilities.

### **CONCLUSION**

Hot weather poses substantial health and safety hazards to low-income persons. Not only does extreme heat impose stress on the human body that can result in death or serious injury, but heat is associated with other dangers as well. Elevated pollution levels dangerous to persons with respiratory ailments are but only one example.

The overwhelming majority of deaths and injuries that are caused by extreme heat are associated with low-income persons –particularly *elderly* persons-- who live in non-air-conditioned homes. While air conditioning is the primary protection against heat-related illness and death, low-income individuals often lack the financial capability to install air conditioning, or to operate air conditioning even if it *is* installed.

One community strategy to prevent the tragedies that arise because of this lack of access to cooling is the preparation of a written community Heat Response Plan. A local fuel fund can and should play a central role, both in the preparation of such a plan and in its implementation

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