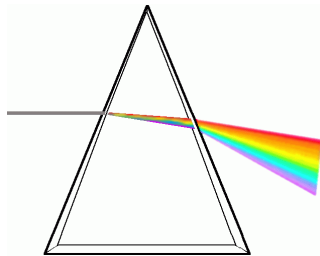


Making Links Between High-Priced Home Energy And Public Health: Pathways of Exposure And A Spectrum of Adverse Outcomes



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Overview of Remarks

- Why health and why now?
- Pathways from unaffordable home energy to health
- Unaffordable home energy + low-/fixed-income households = A spectrum of adverse health effects
- Immediate effects
- Longer term effects
- On the horizon: rising energy prices & climate change
- Closing thoughts: next steps?

Why Health & Why Now?

- LIHEAP, WAP, fuel funds, and state ratepayer-funded programs struggle to meet need, given record high arrearages and shutoffs and rising prices for home energy; why worry more about health now?
- NEADA 2005 Survey of LIHEAP recipients:
 - 47 percent have family member with asthma, emphysema, heart disease, or stroke
 - about 40 percent report not filling a prescription or taking less than a full course of prescribed medication due to unaffordable energy bills.
 - 19 percent have a household member who uses medical equipment requiring electricity (nebulizer, oxygen machine); almost half of these families report going without health care due to unaffordable energy bills and one-quarter report becoming ill as a result of living in a home that was too cold

Why Health & Why Now? (cont'd)

- Implications: utility regulatory consumer protections, as health evidence argues for public health measures (state authority)
- Implications: affordable housing as millions of seniors and disabled leaving nursing and group homes for independent living under Medicaid (major part of state budgets)
- Implications: climate change, policy & planning for same by states and federal government (public health preparedness)

Pathways*: Physical Exposures

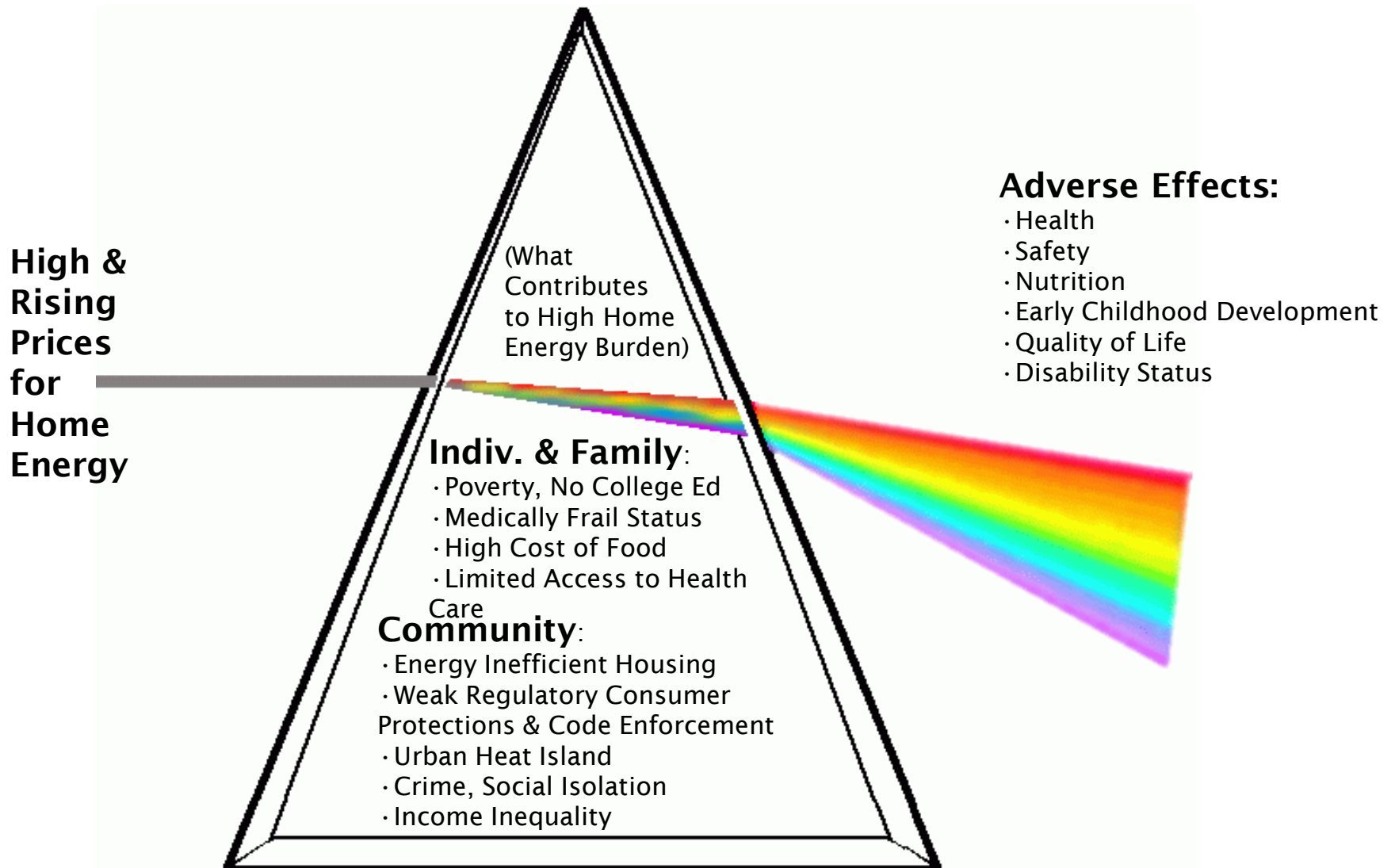
- Exposure to excessive heat or cold, moisture.
 - Turn down heat or a/c to inadequate level (outside moderate temp range of 60s-70s degrees F)
 - Energy inefficient dwelling unable to be kept at moderate temp range
 - Utility shutoff
 - Humidity results in exposure to mildew, mold
- Exposure to fire or poisoning hazard when use unsafe means to heat or illuminate dwelling
 - Heat with stove/oven, BBQ grill, toaster oven; space heater
 - Light with candles

* Term used in Medical Legal Partnership's Child Health Impact Assessment.

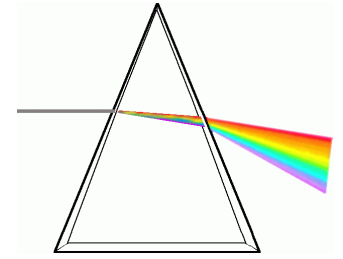
Pathways: “Heat or Eat”

- the squeeze put on home budgets by high utility bills leads households to make hard choices, facing shutoff or
 - food insecurity/hunger, malnutrition (tradeoff with food)
 - avoidable hospitalization, worsening of pre-existing illness (ex., hypertension) (tradeoff with health care/medication)
 - homelessness (ex., loss of section 8 voucher) or institutionalization (ex., into nursing home) (tradeoff with rent/mortgage)
- NEADA 2005 survey: energy burden reported as reason that
 - 73 percent reduced purchase of household necessities
 - 20 percent went without food at least one day in past 5 years
 - 24 percent did not pay rent/mortgage
 - 32 percent did not fill prescriptions in full or take as directed

Energy Prices Through The Lens of Low- and Fixed-Income Households: A Spectrum of Adverse Effects

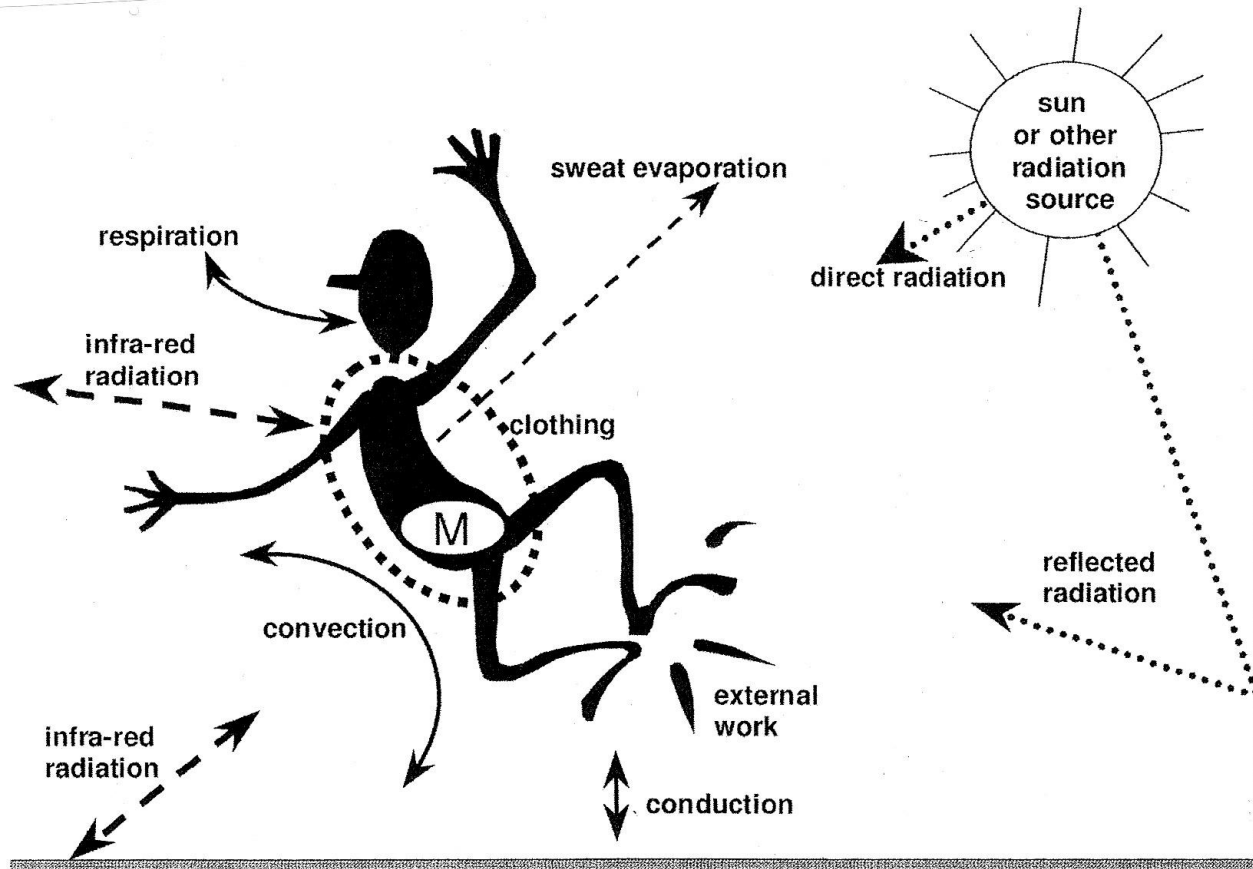


Immediate Effects



- Heat-related (exhaustion, cramps, stroke, hyperthermia)
- Cold-related (hypothermia)
- Psychosocial, stress
- Nutrition/food insecurity and hunger
- Unintentional injuries & deaths (burns, CO poisoning)
- Respiratory diseases (asthma in children, pneumonia & bronchitis in adults)
- Cardiac disease (hypertension, clotting, stroke, heart attack)
- Premature death (excess deaths from public health standpoint)

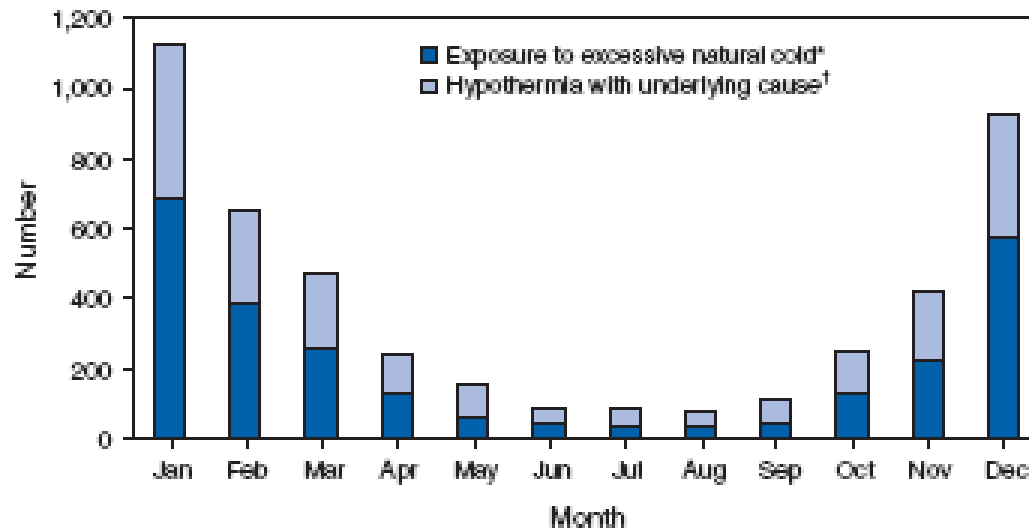
Exposure to Excessive Heat or Cold



Schematic representation of the pathways for heat loss from the body. M = metabolic heat production (reproduced with permission, Havenith, 1999)

Estimated Number of Deaths From Cold Exposure

FIGURE 1. Number of hypothermia-related deaths, by month — United States, 1999–2002



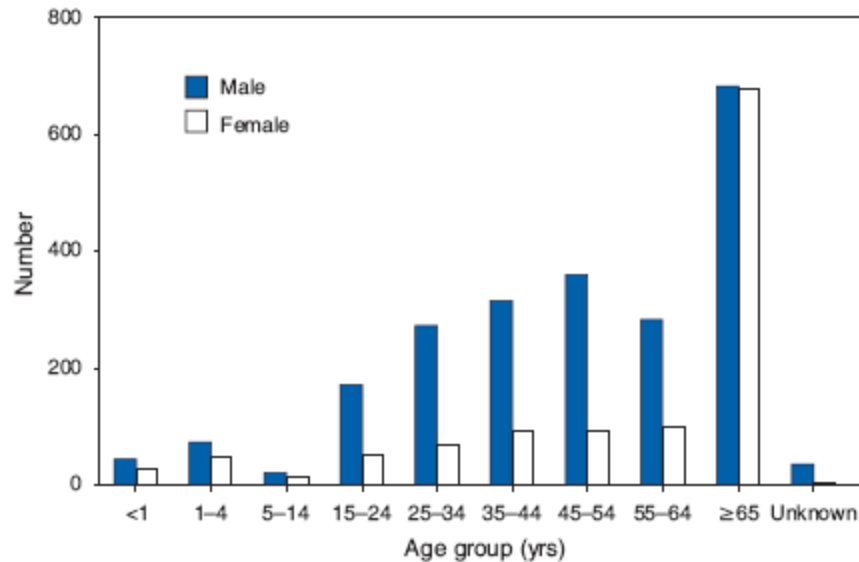
* 2,622 deaths identified by code X31 of the *International Classification of Diseases, Tenth Revision* (ICD-10).

† 1,985 deaths with underlying causes of death other than exposure to excessive natural cold (e.g., falls, atherosclerotic cardiovascular disease, or drowning) identified by ICD-10 code T68.

Source: Murphy et al., 2006.

Estimated Number of Deaths from Heat Exposure

FIGURE. Number of heat-related deaths,* by sex and age group — United States, 1999–2003



* Exposure to extreme heat is reported as the underlying cause of or a contributing factor to death (N = 3,442).

Source: Luber et al., 2006.

TABLE. Selected underlying causes of death with hyperthermia* as a contributing factor† — United States, 1999–2003

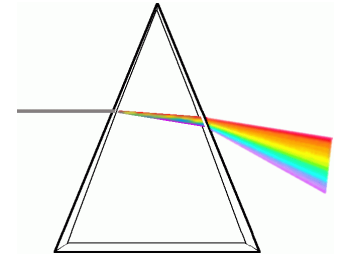
Underlying cause of death	No.	(%)
Cardiovascular diseases	681	(56.6)
Chronic ischemic heart disease	473	(39.3)
Acute ischemic heart disease	63	(5.2)
Hypertensive heart disease without congestive heart failure	60	(5.0)
Other cardiovascular diseases	85	(7.1)
External causes of morbidity and mortality	345	(28.7)
Accidental poisoning by and exposure to noxious substances	51	(4.2)
Assault	63	(5.2)
Other external causes of morbidity and mortality	231	(19.2)
Diseases of the respiratory system	37	(3.1)
Chronic obstructive pulmonary disease, unspecified	27	(2.2)
Other diseases of the respiratory system	10	(0.8)
Endocrine, nutritional, and metabolic disorders	38	(3.2)
Unspecified diabetes mellitus	26	(2.2)
Other endocrine, nutritional, and metabolic disorders	12	(1.0)
Mental and behavioral disorders	29	(2.4)
Mental and behavioral disorders due to alcoholism	21	(1.7)
Other mental and behavioral disorders	8	(0.7)
Diseases of the digestive system	22	(1.8)
Fibrosis and cirrhosis of the liver	15	(1.2)
Other diseases of the digestive system	7	(0.6)
Other diseases of the nervous, infectious, immune, and genitourinary systems and neoplasms	51	(4.2)

* Abnormally high body temperature caused by the body's inability to dissipate heat.

† N = 1,203.

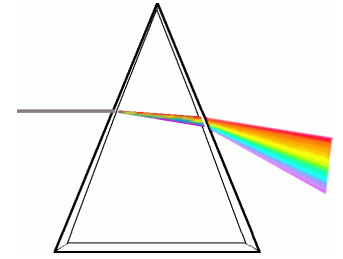
Source: Luber et al., 2006

Respiratory Disease



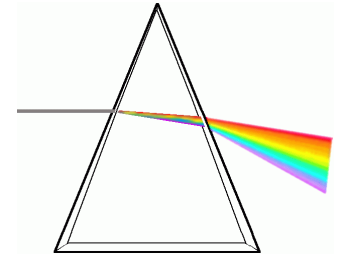
- Cold: Fewest deaths from respiratory disease (pneumonia, bronchitis) around 64 degrees F, with risk of death increasing by 2.5 percent for every 1.8 degree decline below 64 degrees F; the presence of bedroom heating for less than 4 hours per night and of relatively low living room temperatures at night are each associated with greater risk of death (Eurowinter Group, 1997).
- Heat: Deaths from respiratory disease increase by 12.8 percent for each 1.8 degree F rise in average temperature above 61.7 degrees F (Huynen et al., 2001)

Cardiac Disease



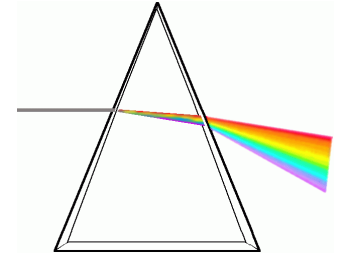
- Heat: At 90 degrees F, a 22 percent greater risk of death from coronary artery disease and a 66 percent greater risk of death from heart attack, compared with deaths seen at moderate temperatures (between 79 and 84 degrees F) (Pan et al., 1995)
- Cold: Risk from death from ischemic heart disease increases by 1 percent, and from stroke by almost 1 percent, for every 1.8 degree F drop in indoor temperature below 64.4 degrees F (Eurowinter Group, 1997)
- Cold: Days after a big temperature drop, the risk of experiencing a stroke jumps by almost 3 times; for people with hypertension, the odds of a stroke are greater than 3 times and for those with high blood cholesterol, the likelihood is over 9 times as greater (Hong et al., 2003).

Existing Health Conditions Made Worse



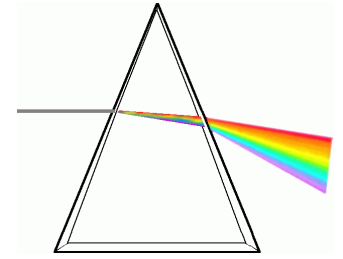
Extreme heat: Over 800 more people than expected died during the four day Chicago heat wave in 1995, and hospital admissions for seniors increased by 35 percent: the new admits were more likely than average to have pre-existing conditions including kidney disease, diabetes, cardiovascular disease, and nervous system disorders like Parkinson's and depression (Semenza et al., 1999).

Premature Death



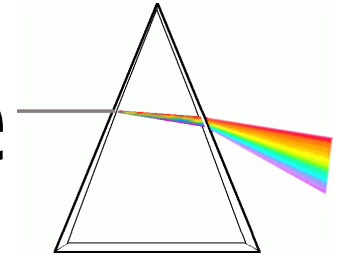
- No heat wave needed: During the summer months (May through September), a 10 degree Fahrenheit increase in temperature correlates with a 2 to 3 percent increase in deaths (Basu et al., 2008; Zanobetti and Schwartz, 2008).
- **Central air-conditioning saves lives.**
 - Those living in homes with central a/c are significantly less likely to die (42 percent) than are those in homes without air-conditioners, with positive effects seen for window a/c units in smaller residences (Rogot et al., 1992).
 - A study of deaths in Pittsburgh, Chicago, Detroit, and Minneapolis-St. Paul finds that heat-related deaths are more common among persons identifying themselves as Black (5 percent higher death rate) and that over two-thirds of this racial disparity reflects the lack of central a/c among Black households (O'Neill et al., 2005).

Longer Term Effects



- Early childhood development
- Use of health services (ie preventable hospitalization)
- Homelessness, institutionalization (nursing home, group home)

Nutrition, Health Service



- In northern states, poor families with children spend less on food, and children have lower caloric intake during winter months, compared with higher-income families (Bhattacharya et al., 2002).
- Nord & Cantor (2006): Low-income seniors in northern states more likely to go hungry in late winter/early spring; in southern states, more likely to go hungry in summer (Nord & Kantor, 2006).
- **Energy Assistance Protects Against Hunger and Reduces Hospitalizations.** Young children (<3 yrs of age) in families eligible for but not enrolled in LIHEAP are
 - more likely to be at risk for growth problems and to need hospital admission on the day of a health care visit, compared with children whose families are enrolled in LIHEAP (Frank et al., 2006).
 - Have lower mean weight for age and are 30 percent more likely to be at nutritional risk (weight for age less than 5th percentile) (C-SNAP, 2003)

What's Next?

- Rising energy prices
- Greater numbers of medically vulnerable persons living independently; over 2.7 million received Medicaid long-term care services at home in 2004 (Kitchener et al., 2007)
- Climate change brings increase in ambient outdoor temperatures and in weather extremes; predicted heat stress & air pollution, flooding, diseases caused by food (Salmonella poisoning) & vectors (rats, mosquitos, ticks) (Kovats & Hajat, 2008; Menne & Ebi, 2006)

Next steps?

- LIHEAP outreach with health care providers and in health care settings (Medical Legal Partnership for Children's Energy Clinic, Ohio LIHEAP, DC REACH)
- LIHEAP coordination with state Medicaid programs that offer home- and community-based long-term care services
- State utility regulatory consumer protections based on public health and safety
- Greater funding of LIHEAP, WAP, fuel funds, energy affordability programs
- Research to demonstrate spectrum of effects tied to unaffordable home energy

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