

Residential Weatherization and Energy Efficiency Upgrades as Severe Weather Adaptation

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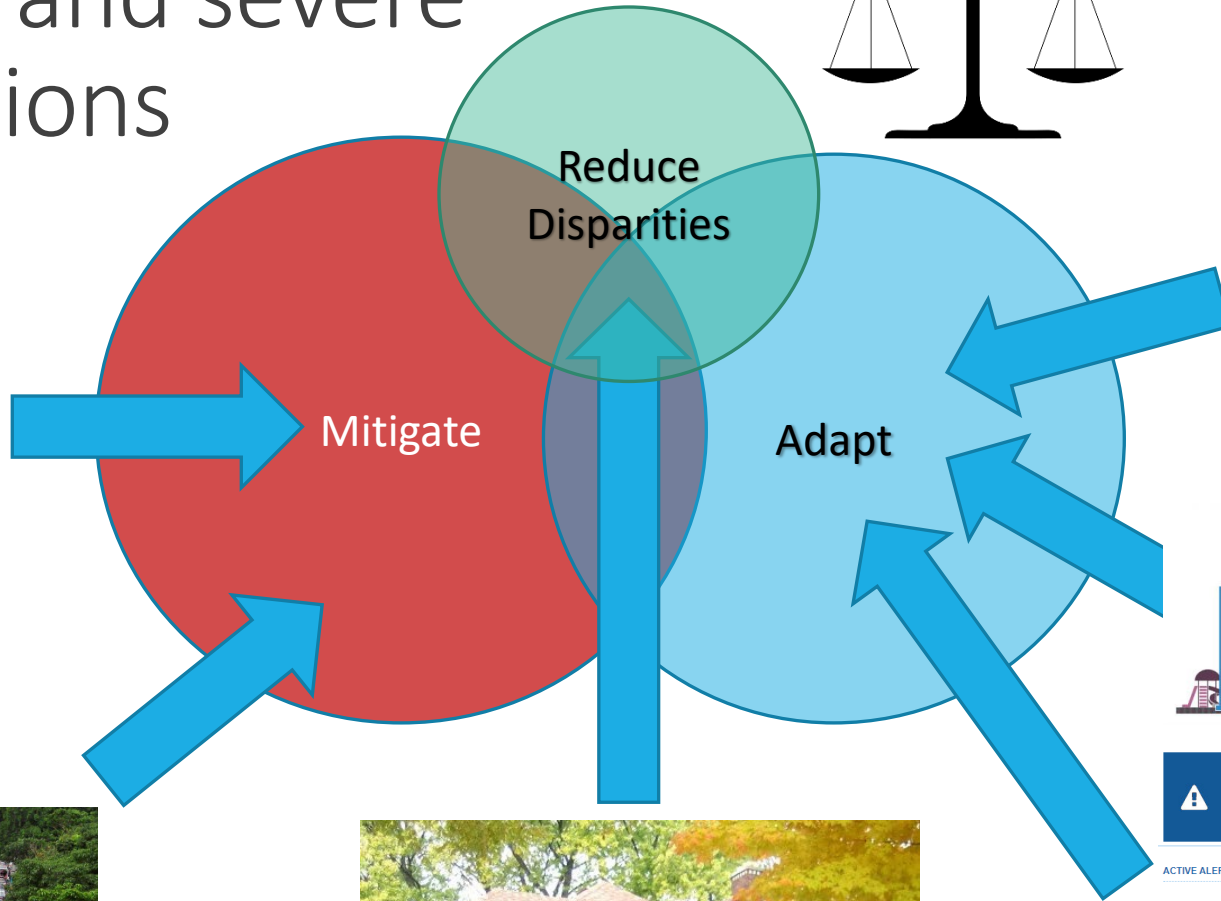
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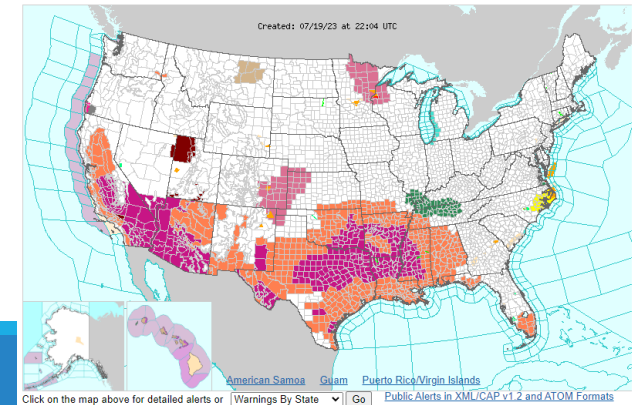
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Healthy aging and severe weather solutions



Tropical Storm Calvin Impacting Hawaii; Mid-South Flash Flooding; Intense Heat Continues
Tropical Storm Calvin will bring heavy to excessive rain, life-threatening surf in exposed areas, and strong winds. Abundant heat, moisture, and instability is producing life threatening flash flooding in western Kentucky and southern Illinois. Severe storms are possible in the Midwest and Upper Midwest. Dangerous heat stretches across the Southwest and South. [Read More](#)

ACTIVE ALERTS FORECAST MAPS RADAR RIVERS, LAKES, RAINFALL AIR QUALITY SATELLITE PAST WEATHER



Click on the map above for detailed alerts or Warnings By State | Go | Public Alerts in XML/CAP v1.2 and ATOM Formats

Challenges to Climate Resilience

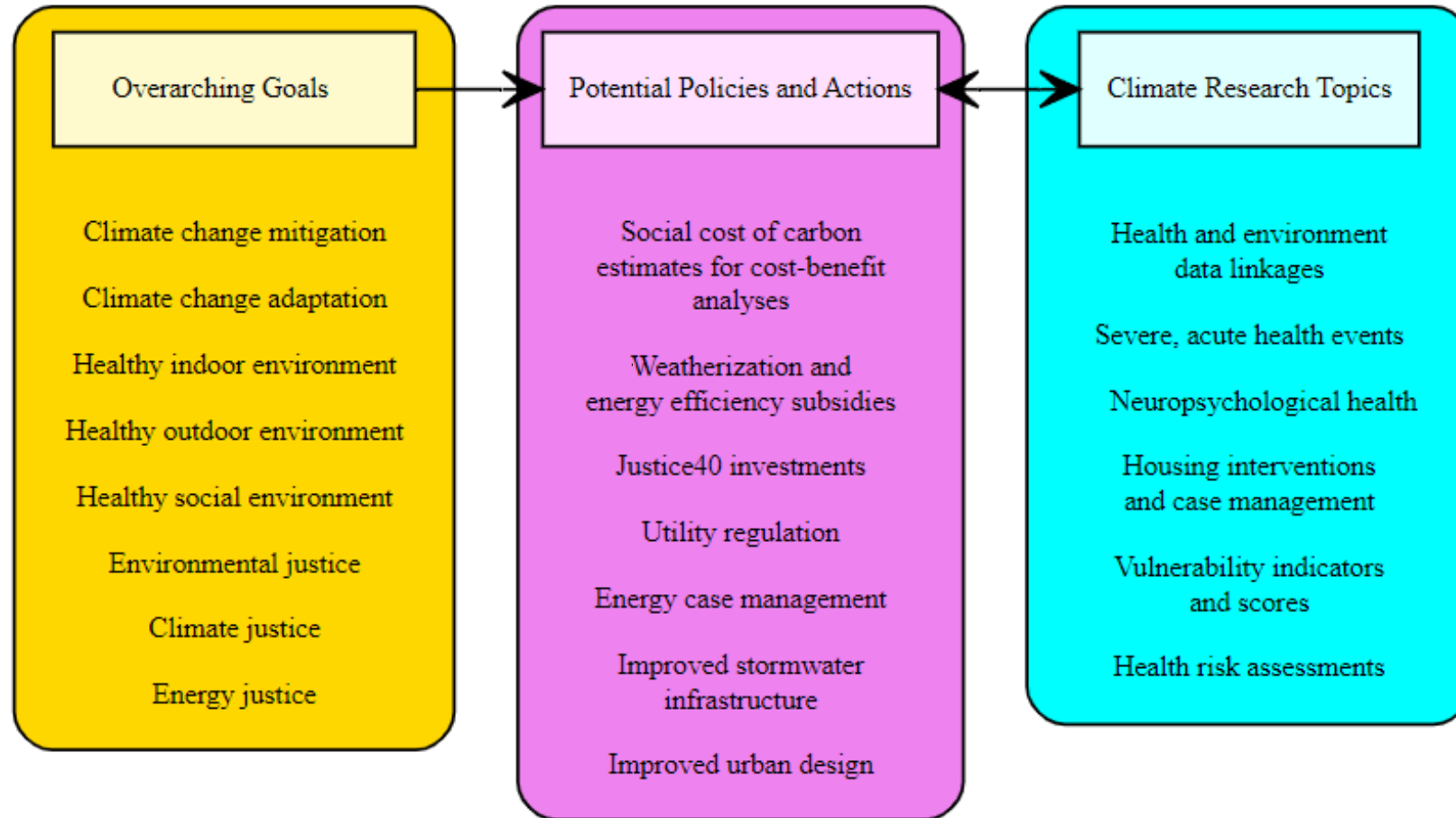
Heat-or-eat dilemma



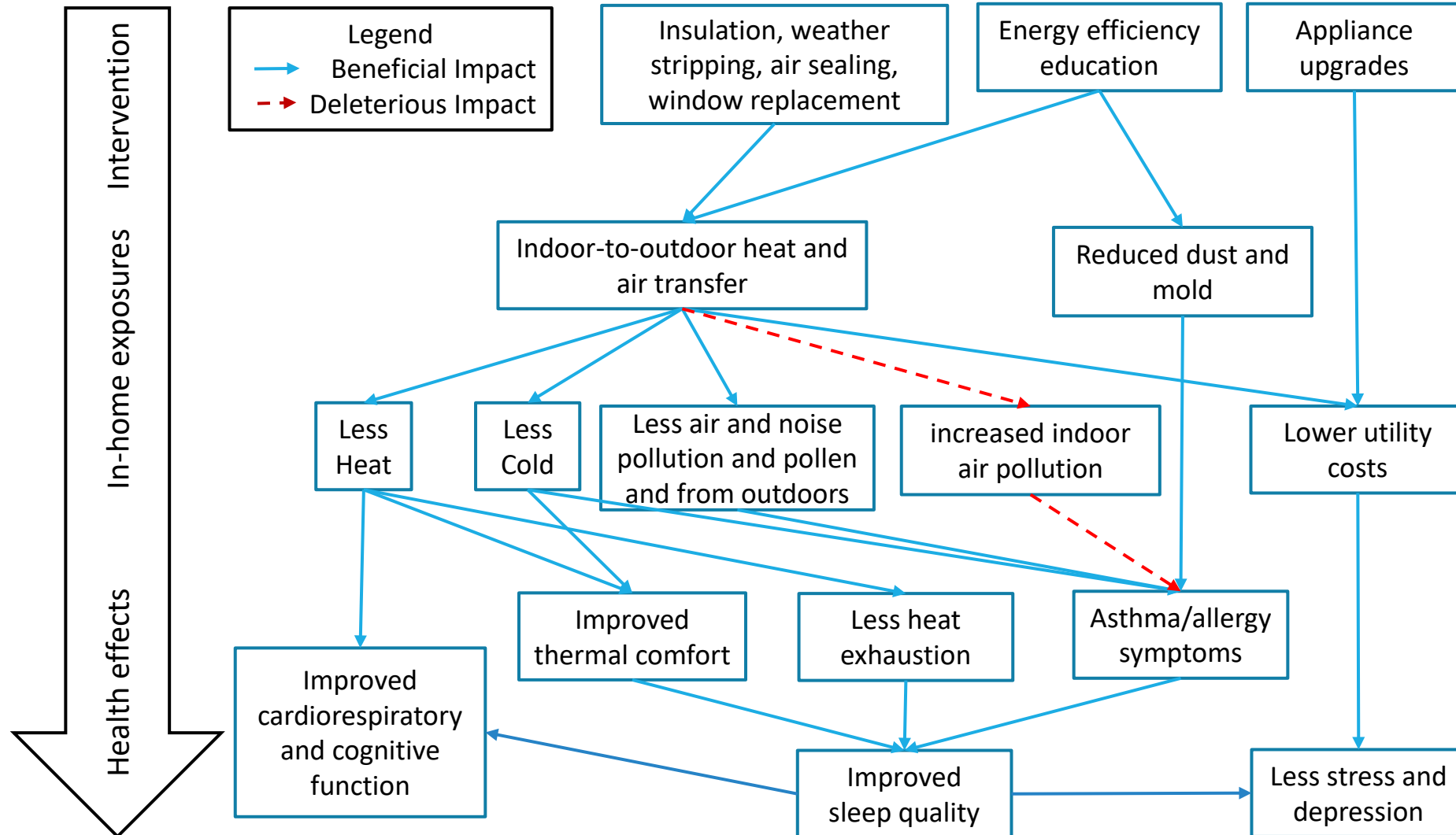
“Hot little boxes”



Healthy Aging and Severe Weather: What Can Researchers Do?



Healthy Indoor Environment: Potential Health Impacts of Weatherization and Energy Efficiency Upgrades and Education



Previous Research: Weatherization Health Benefits

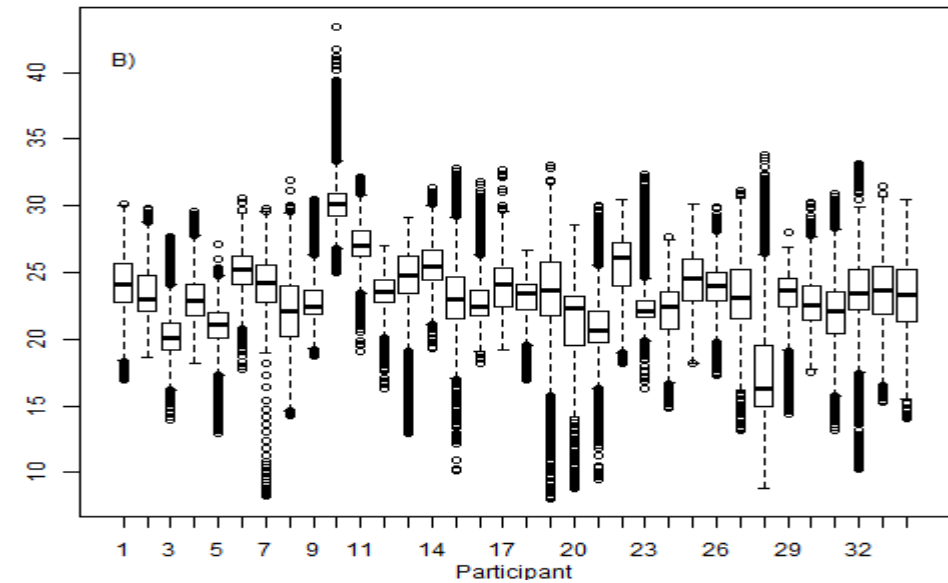
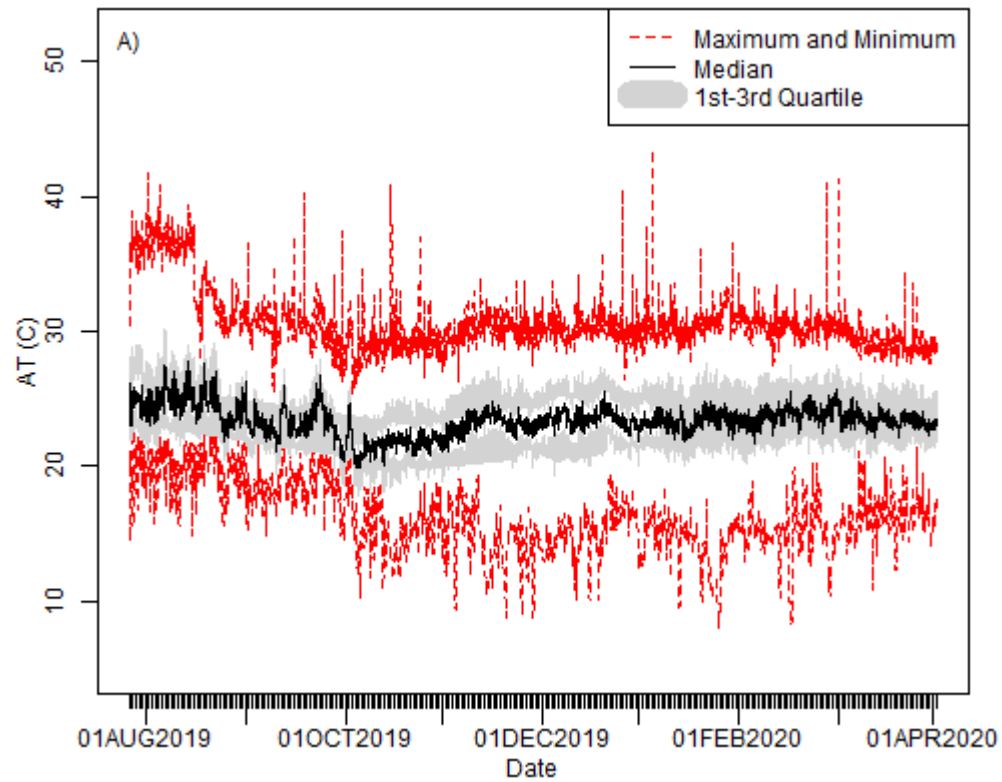
A review of 21 studies in the U.K., Australia, Canada, and New Zealand found improvements in respiratory symptoms and symptoms of other chronic illnesses, improved mental well-being, reduced medical visits, and fewer missed work days (Milner & Wilkinson 2016).

A randomized controlled trial of a heating intervention in New Zealand showed reductions in asthma symptoms among children (Howden-Chapman et al. 2008).

In the U.S., weatherization was linked with reduced asthma or allergy symptoms and reductions in psychological distress in adults (Tonn et al. 2018, Francisco et al. 2017, Breyse et al. 2014)



Indoor apparent temperature (AT) maxima, minima, and medians by hour (A) and boxplots by participant (B) in 34 Detroit, Michigan participants, July, 2019-April 2020 (Gronlund et al. Indoor Air 2021).



Non-Energy Impacts

Benefit	Cost Reduction Per Unit Over 10 Years
Reduced Asthma Emergency Department Visits and Hospitalizations	\$2,000
Thermal Stress—Cold (Reduced Medical Attention)*	\$3,900
Thermal Stress—Heat (Reduced Medical Attention)*	\$870
Food Assistance Reduction	\$830
Reduction in Missed Days at Work	\$200
Total Savings Per Unit	\$7,800

*Estimated based on value of a statistical life of \$7.5 million and ratio of hospitalizations to deaths for cold and hot thermal stress.

Tonn et al. 2018 Energy Policy

Weatherization and Health Effects Study

indoor temperature and humidity monitor

in-person first visit and health survey

phone calls (or web-based survey) every month about health including cognition

participant mails back indoor temperature and humidity monitor after one year

week-long sleep measures (participant wears an actigraph on wrist) pre- and post-intervention

600 individuals over 3 years



Energy Case Management Study



~ 100 homes in Detroit

utility bills

eGauges

in-home energy efficiency
evaluation

personalized recommendations
and assistance

Need to Know About the Indoor Environment via Surveys

- mechanical heating and cooling usage and barriers
- utility bills and square footage
 - energy use per square foot and number of residents
 - economic burden
- housing conditions
 - flood damage and mold
 - roof damage and leaks
 - single-pane windows



Community Engagement to Address Urban and Rural EJ Communities

Building trust with communities of interest by:

Considering immediate priorities in climate/energy/environmental justice communities

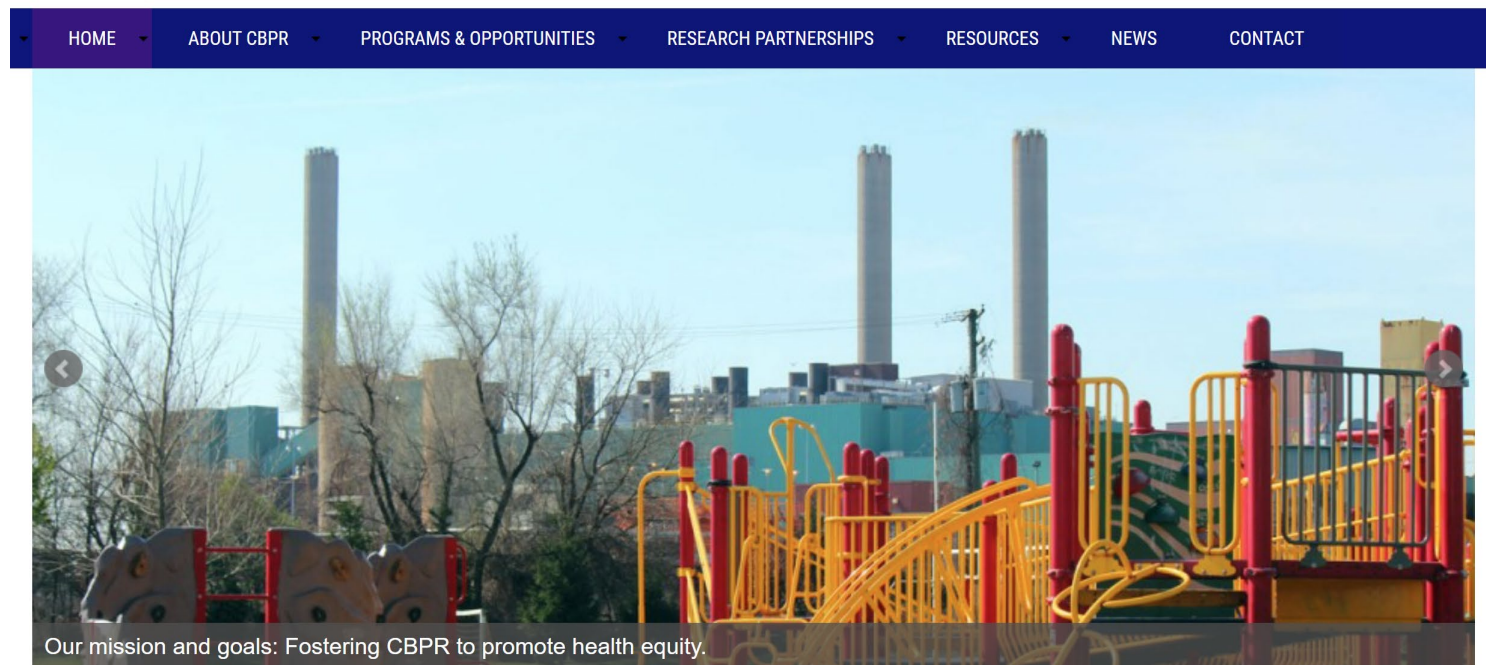
- Study short-term adaptation strategies in addition to medium- and long-term strategies
- Appropriate compensation
- Make descriptives and simple analyses immediately available to community for tailoring short-term solutions and for advocacy

Sharing back results and progress

Community-Based Participatory Research: community representatives are your co-investigators, helping to design grant and study, execute study, analyze results, and disseminate results



The Detroit URC: fostering health equity through community-based participatory research (CBPR) for over 25 years

 SEARCH

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