



Ahmedabad Community Members, IIPH Heat Health Survey 2011; Credit: Kathy Tran/ Dr. Gulrez Azhar

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Building Resilience to Extreme Heat: Top Strategies for Protecting India's Slum Communities from Heat Waves

India is facing increasingly frequent extreme weather events due to climate change. Extreme heat events in particular have a significant impact since summer temperatures are historically high. Little is scientifically known about what makes certain populations more vulnerable to extreme heat and what strategies can best minimize heat exposure and susceptibility in this rapidly developing nation. To prepare the public for rising extreme heat, the Indian Institute of Public Health, Gandhinagar (IIPH), Emory University and the Natural Resources Defense Council (NRDC) conducted a scientific study to characterize factors affecting vulnerability in summer 2011 in Ahmedabad, Gujarat, India. Ahmedabad's seasonal highs have reached 46.8°C (116.2°F), most recently in May 2010. Based on our research and analysis, the following recommended interventions to help residents of Ahmedabad's slum communities protect themselves and adapt to increasing temperatures are identified below.

TOP STRATEGIES TO PROTECT SLUM COMMUNITIES

Early Heat Warnings: Have community health workers, community leaders, and gatekeepers disseminate warnings and information: Although doctors in urban health centers are accessible, residents do not seek treatment or prevention tips, likely because mild heat-related illnesses are currently not recognized. Community health workers, who have personal relationships with many residents and already visit slums regularly for other health issues, can disseminate heat warnings and health information. Each slum also has key, trusted community members who can notify residents of impending heat waves.

Ahmedabad Municipal Corporation (AMC) can help disseminate the following information through these channels:

- Provide heat warnings at the beginning of each summer and during heat waves;
- Give tips to keep cool and avoid heat stress such as drink water often and reduce outdoor activities during daytime;
- Distribute key health information to help recognize signs and symptoms of heat stress to prevent heat illnesses;
- Target health information and tips to specific occupations commonly held by slum residents;
- Increase awareness of heat-related illnesses among physicians at local urban health centers and have them disseminate key information. Doctors have been identified as trusted and easily accessible within at-risk communities. Ensuring doctors can identify heat-related symptoms and also help residents recognize signs and symptoms can prevent severe morbidity and mortality.

The AMC can work with physicians and public health officials to adopt the following heat warning measures:

- Post heat illness prevention tips at urban health centers;
- Caution all patients they see about potential health effects of high temperatures at the start of and during the summer;
- Examine patients being treated for signs and symptoms of heat-related illnesses as a preventative measure;
- Help public health officials hold a workshop to educate physicians on the significance of heat-related illnesses, how to recognize symptoms, and how to raise awareness among patients.
- Establish a city-wide system to report and record heat-related diagnoses and mortality to understand the prevalence and incidence of heat-related illnesses and evaluate the effectiveness of potential interventions.

Get Out the Message: Deliver important health and heat information through television campaigns. Most slum residents identified television as their primary source to receive warnings and news. The AMC can work with television, radio and newspapers to disseminate information on: heat-related illnesses prevention campaigns – including tips to stay cool and how to prevent getting sick from heat – and extreme heat advisories, to alert residents of extreme heat at the beginning of summer and right before and during heat waves.

Grow Green: Plant trees in and around slum communities. Most slum communities lack green cover, with only some trees located on the perimeters. Planting trees can provide shade, and reduce urban heat island effect and air pollution. It is also more cost-effective and requires less maintenance than establishing cooling centers near slum communities.

Knock on Neighbors' Doors: Encourage neighbors to check on each other during heat waves. Encouraging social connections through neighbors proactively checking on each other during extreme heat events could prevent more severe health consequences. Community health workers, physicians and community leaders could promote protective behaviors when discussing health effects and prevention strategies.

Protect Outdoor Workers: Target interventions toward specific occupations where employees are frequently exposed to heat by working outdoors in direct sun. Public health officials could work with employers to change certain practices to reduce employee exposure or instruct how to provide employees with tips to protect themselves from overexertion and heat-related illnesses (especially during heat waves). They could work directly with employees within identified occupations (e.g., masons and construction workers) to promote ways to keep cool.

Who Is Most Vulnerable to Extreme Heat: Eight Key Factors

Age – For every 5 years a slum resident ages, their odds of experiencing heat-related symptoms and/or illnesses increased more than 20%.

Income – The average slum resident lives below the poverty line, and has less access to, and means to afford, potable water and medical care, and are more likely to work in the direct sun.

Pre-existing Conditions – About three members per household had pre-existing conditions. The odds of heat-related illnesses strongly increased (more than 50%) if the slum resident had a pre-existing chronic, diarrheal, or infectious condition.

Work Location – 90% of employed respondents worked outdoors during the summer. Working in direct sun greatly increased the odds of heat – related illness, by about 95%.

Drinking Water Access – Most residents had limited access to water, and 70% of respondents drink tap water, which reduced the odds of heat-related illness by 50%.

Access to Doctors – Nearly all households reported that seeing a doctor was convenient, but many residents said they do not see a doctor for heat-related symptoms and illnesses.

Access to Information – All households reported hearing of extreme heat warnings during summer 2011, with 53% hearing from other people and 46% being notified through media sources (primarily TV, but newspaper second-most). Households who did not seek information on heat-related illnesses previously were much more at risk.

Social Connectedness – Most residents felt safe in their community due to strong neighbor relations. These reliable social ties can be utilized during heat waves.

Scientific Methodology for Heat Health Assessment

The assessment of the slum communities was conducted by IIPH and as part of a master's thesis at Emory University Rollins School of Public Health in April 2012 by Kathy Tran, advised by Dr. Jeremy Hess. The study was done in collaboration Mt. Sinai School of Medicine and NRDC after a March 2011 heat and health vulnerability workshop with local and state officials in Gujarat. The survey used randomized sampling to identify target households located in thirteen urban slum communities in Ahmedabad, since slum residents were identified by local public health authorities as having greater susceptibility and less resilience to extreme heat exposure. The study focused on factors that affect heat exposure, susceptibility to heat-related illness, and adaptive capacity, all of which feed into vulnerability to heat. These factors' indicators were identified through literature review and expert opinion, and characterized through a cross-sectional household survey. Survey questions included demographics, occupational conditions, housing conditions that might confer heat exposure, coping methods, access to heat/health information, and social connectedness. 300 respondents (primarily female heads of household) provided information on behalf of their households, providing information for a total of 1,650 individuals.