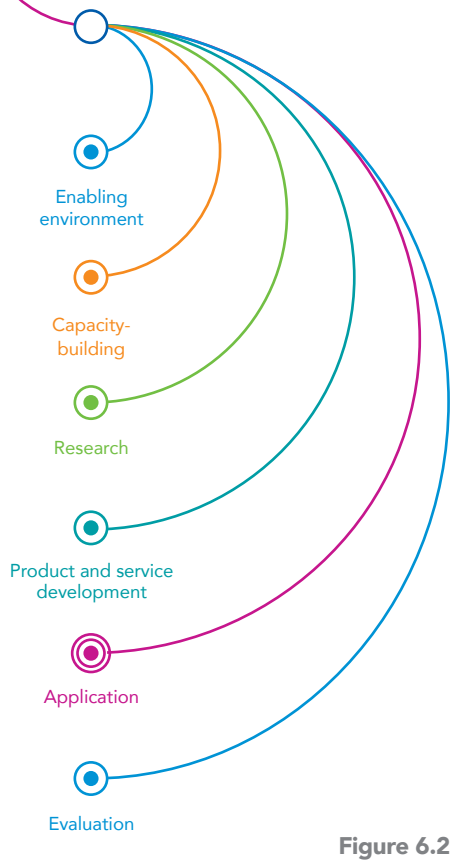

CASE STUDY

INNOVATIVE HEAT WAVE EARLY WARNING SYSTEM AND ACTION PLAN IN AHMEDABAD, INDIA

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CONTEXT

More than 7 million people live in the rapidly urbanizing city of Ahmedabad, located in the state of Gujarat in Western India. Heat waves have already proven to be dangerous in the city, leading to heat stress, heat stroke and heat-related illnesses. Climate change is creating higher daily peak temperatures and longer, more frequent and intense heat waves. Following a deadly heat wave in May 2010, the Ahmedabad Municipal Corporation (AMC) realized that coordinated action was needed to protect its residents from extreme heat and to become more climate-resilient *(1)*.

Figure 6.2 Ahmedabad survey respondents, 2011. Photo credit: Kathy Tran/Gulrez Azhar.

NEW APPROACHES

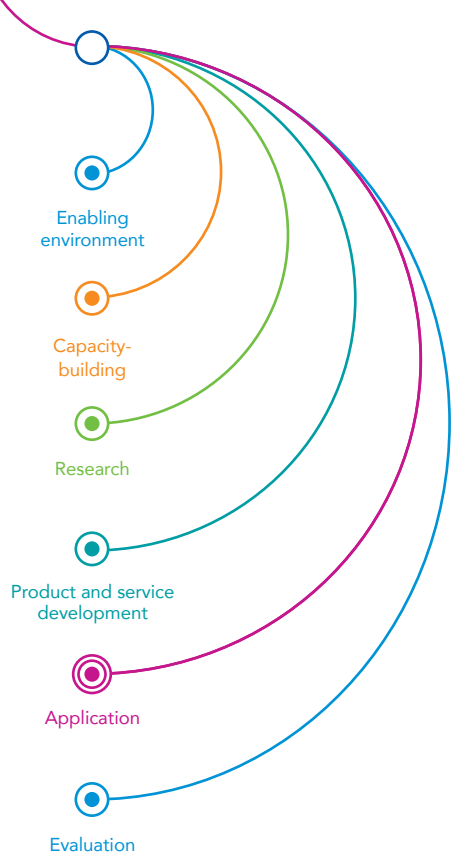
A coalition of academic, health and environmental groups partnered with the AMC in 2011 to create an early warning system and heat preparedness plan as a roadmap to save lives during dangerous heat waves *(2)*. In collaboration with the Ahmedabad Municipal Corporation, the Ahmedabad Heat and Climate Study Group consists of Natural Resources Defense Council; Indian Institute of Public Health, Gandhinagar; Emory University; and Icahn School of Medicine at Mount Sinai, in New York City. Dr Peter Webster and Dr Violeta Toma of Georgia Institute of Technology provided the long-term temperature forecasts for the Ahmedabad health early warning system. The project was supported in part by the Climate and Development Knowledge Network.

When the project began in 2011, communication of impending extreme heat was limited among municipal agencies. At the time, the India Meteorological Department (IMD) issued two-day forecasts daily, but the AMC and other experts indicated a need for forecasts with a longer lead-time and coordinated action to alert the local government, health care centres, and the public to impending heat waves, along with formal communication channels to disseminate these warnings.

The team work to improve heat disaster response planning at the local level by developing an interagency heat action plan, including longer-term forecasting, which would provide early warnings for extreme temperatures and increase heat-related capacities in local health centres. Based on scientific research identifying the city's most vulnerable residents (including children, elderly people, slum communities and outdoor workers), the coalition developed a heat qction plan to increase the climate resilience of the most at-risk residents as temperatures rise. Ahmedabad's groundbreaking plan includes three key strategies:

1. Building public awareness and community outreach on the risks of heat waves and practices to prevent heat-related illnesses. Ahmedabad agencies host trainings and disseminate multilingual pamphlets, advertisements and other informational materials on heat-stress prevention and heat wave safety tips.
2. Initiating an early warning system to alert residents and coordinate an inter-agency emergency response effort when heat waves are forecast. Formal communication channels were created among government agencies, health officials, emergency response teams, community groups, and media outlets to disseminate heat alerts, and longer-term forecasts were developed.
3. Increasing capacity among medical professionals to recognize and respond to heat-related illnesses. Training helped medical professionals better diagnose and treat cases, and reduce mortality and morbidity with standard surveillance protocols *(2)*. Advanced warnings helped health professionals to be on alert for heat-stress patients and prepare additional resources such as ice packs.

In April 2013, the AMC and partners launched the city's initial heat action plan, becoming the first city in South Asia to comprehensively address the health threats of extreme heat *(3, 4, 5)*. The AMC designated its Health Department and a deputy health officer as lead agency and lead officer, respectively, with the overarching responsibility to coordinate all related municipal activities. The lead officer monitors daily temperature forecasts, sends heat alerts and disseminates public health messages to local government departments, health services and the media.



BENEFITS AND LESSONS

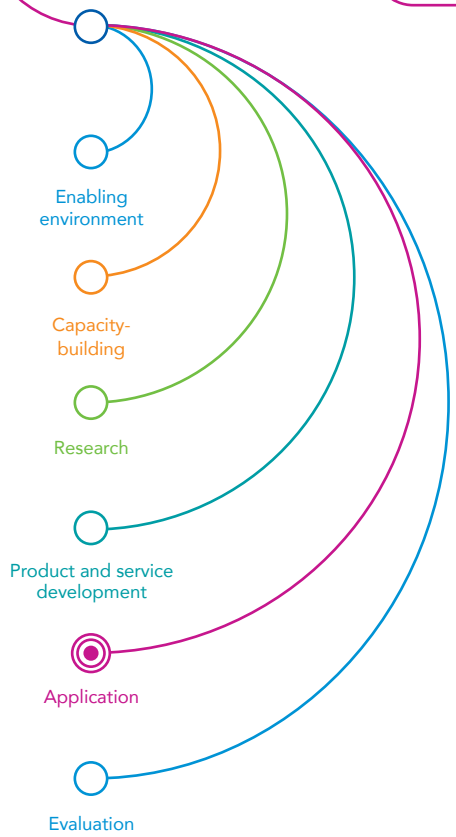
The team developed an innovative seven-day temperature forecast with international experts that complements IMD's forecast. During the hot season, the forecast is sent daily to the lead officer, providing robust forecast and weather warnings, that help to accurately determine when to declare a heat alert and initiate the inter-agency response. As a result, the local IMD has increased its capacity to provide the 5-7 day forecast to the AMC and several other cities.

A new scale of coordinated action between local government and health professionals on heat wave preparedness and forecasting, with input from regional and international health and climate experts, was essential to minimize the dangerous health effects of heat stress and increase vulnerable populations' resilience to rising temperatures in India. To evaluate the effectiveness of the heat action plan during the initial 2013 and 2014 hot seasons, the team conducted surveys with stakeholders actively involved in the plan. The survey focused on whether stakeholders believe the plan was successfully administered, and effectively reached vulnerable populations with preparatory materials and heat alerts. Early findings show that many lives have likely been saved, local health professionals' awareness of predicted heat waves and capacity to care for patients with heat-related illnesses have increased, and overall, Ahmedabad is now much better prepared for heat waves *(5)* [i]. Over 10 cities in key states and regions across India are now developing their own heat action plans based on the Ahmedabad model to increase their own residents' resilience to the impacts of climate change, including the states of Maharashtra, Odisha and Telangana. The National Disaster Management Authority has added information on heat waves to its website and the IMD has adapted its temperatures and heat wave forecasts, in addition to strengthening inter-agency communication. IMD now provides a five-day forecast to more than 100 cities around India to increase cities' capacity to warn citizens and respond to impending heat waves.

Figure 6.3 Ahmedabad residents during community survey, 2011.
Photo credit**:** Kathy Tran/Gulrez Azhar.

Figure 6.4 Local resident reads advertisement in Gujarati with tips on how to stay cool during extreme heat events. Photo credit: Nehmat Kaur.

ACKNOWLEDGEMENTS



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