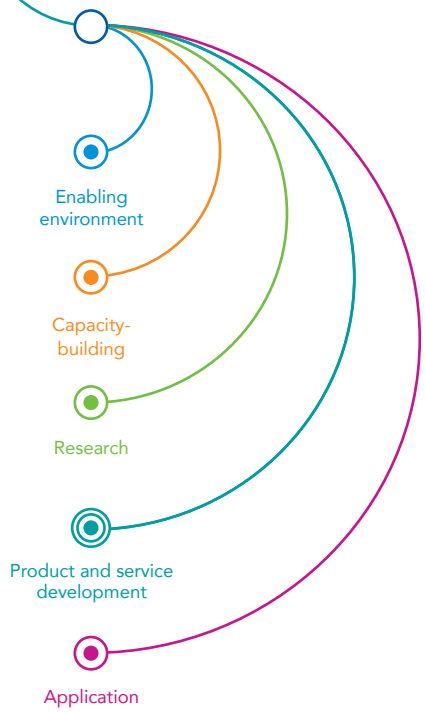
CASE STUDY



PROJECTIONS AND SCENARIOS

HOW HOT WILL IT BE? TRANSLATING CLIMATE MODEL OUTPUTS FOR PUBLIC HEALTH PRACTICE IN THE UNITED STATES

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CONTEXT

What meteorological factors are going to change? How much will they change? Will there be spatial variation? These are foundational issues for public health agencies in preparing for the impacts of climate change. In the wake of the Building Resilience Against Climate Effects (BRACE) framework developed by the US Centers for Disease Control and Prevention (CDC), health agencies in the United States are using forecasted meteorological data to monitor health vulnerabilities across populations and places resulting from climate change.

The available suite of climate model predictions – with nuances on spatial scale, range of hypothetical socioeconomic and greenhouse gas emission futures, uncertainties associated with climate predictions, voluminous data and specific data formats – make processing and interpretation of climate projection information challenging for public health professionals. There is a need for translation of complex climate science for public health practitioners for problem assessment and design of health interventions.

NEW APPROACHES

The CDC responded to this need by collaborating with the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI) to facilitate access to climate projection.

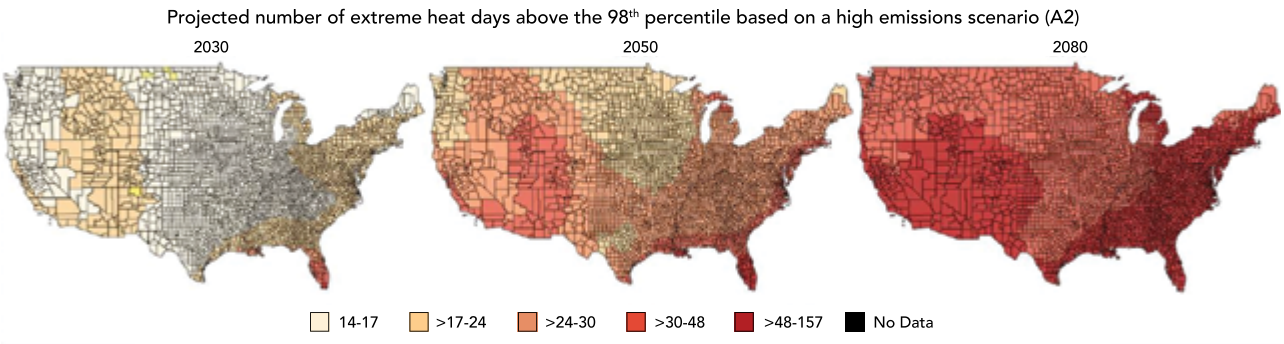
Following record and near record-breaking hot summers in the recent past for regions of the US, local public health agencies have begun implementing heat response plans *(83)*. Availability of information on the location and intensity of increases in future temperature could help agencies design targeted interventions to reduce the adverse impacts of extreme heat.

The recent National Climate Assessment used a comprehensive dataset of projections of daily temperature metrics covering the continental US until 2100. It was produced using a statistical down-scaling method that combined high-resolution observations with outputs from six different global climate models based on two (A2 and B1) future emission scenarios. The gridded output was available at one-eighth degree (approximately 14 kilometres) resolution. Projected annual future values were computed as the average of the six models for a 30-year (a standard length for expressing climatological averages) moving window around each year. Thus, the annual value for 2084 is an average of the 30-year period from 2070–2099.

Since a meaningful geographic unit of resolution relevant for public health surveillance in the US is a 'county', information in the gridded output was converted to conform to county boundaries.

Using a geographic information system (GIS), temperatures from grids were assigned to counties. In cases where multiple grids spanned a county, the grids over areas of greater population density were given greater weight while calculating the average temperature value for the county. The data on annual 'projected number of future extreme hot days' by counties is available for viewing and downloading from the CDC Environmental Public Health Tracking Network portal *(84)*. Since the objective was to provide information on extreme heat in the future, a user can query future projections of temperature for counties in the continental US, for any year between the near (2020) and distant future (2084). One could then choose either the A2 or B1 emission scenarios used by the IPCC, and specify an absolute (90oF, 100oF) or relative (98th percentile based on temperature distribution during 1971–2000) threshold to define the extreme hot day. Results are produced in a map, graphical or tabular format. An example of the temperature distribution is shown in Figure 5.35 for 2030, 2050 and 2080.

Figure 5.35 Example of output from the US CDC Environmental Public Health Tracking Network portal.



ACKNOWLEDGEMENTS

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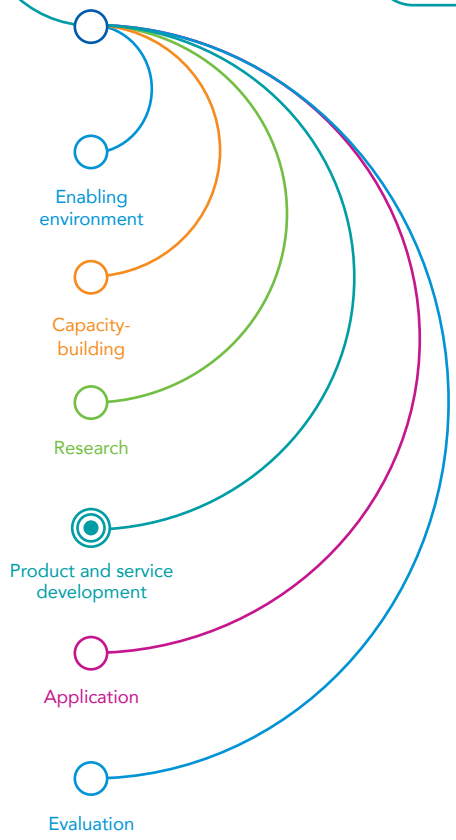
U.S. DEPARTMENT OF COMMERCE

BENEFITS AND LESSONS

Using this approach as a template, information on projected precipitation included in the National Climate Assessment has also been incorporated into the portal. State public health agencies funded through the Climate Ready States and Cities Initiative (CRSCI) by the Climate and Health Program in the CDC are currently using this information to prepare for future vulnerabilities from extreme heat in respective jurisdictions *(85)*. The spatial scale relevant to public health decision-making should be considered when transforming the climate data for use by public health practitioners.



REFERENCES

UNITED STATES

83. White-Newsome, JL et al., Survey of County-Level Heat Preparedness and Response to the 2011 Summer Heat in 30 U.S. States. Environ Health Perspect. doi:10.1289/ehp.1306693

84. CDC, Tracking Environmental Health Data for Public Health Decision-Making. Available at: http://www.cdc.gov/nceh/tracking/ (Accessed 1 Oct 2017).

85. Wisconsin Climate and Health Program. Understanding the Link Between Climate and Health. Available at: http://www.dhs.wisconsin.gov/publications/P0/P00709.pdf (Accessed 1 Oct 2017).

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