

# Environmental Public Health Tracking ASTHO State-to-State Peer Fellowship Report

---

Submitted by  
Jennifer Botsford  
Program Manager

Arizona Department of Health Services  
Office of Environmental Health  
150 N 18<sup>th</sup> Avenue, Suite 140  
Phoenix, AZ 85007

Submitted to  
Association of State and Territorial Health Officials  
Environmental Public Health Tracking State-to-State Peer Fellowship Program  
2231 Crystal Drive, Suite 450  
Arlington, VA 22202



May 20, 2011

## Introduction

---

According to the CDC, Environmental Public Health Tracking is the “ongoing collection, integration, analysis, interpretation, and dissemination of data from environmental hazard monitoring, and from human exposure and health effects surveillance.”

In 2001, the Pew Environmental Health Commission issued a report discussing the need for a National Environmental Public Health Tracking (NEPHT) Network.<sup>1</sup> The following year, US Congress provided CDC with funding to begin the NEPHT Network, which is “a system of integrated health, exposure, and hazard information and data from a variety of national, state, and city sources.”<sup>2</sup>

Currently, CDC funds 23 states and 1 city to build and implement local tracking networks. Since first learning about the tracking network, the Arizona Department of Health Services has been extremely interested in learning how to develop the network in Arizona. Arizona is not one of the CDC funded entities, so ADHS elected to participate in ASTHO’s Environmental Public Health Tracking State-to-State Peer Fellowship Program to learn more about the tracking network in order to evaluate the feasibility of developing a tracking network.

## Background

---

The Office of Environmental Health (OEH) within the Arizona Department of Health Services (ADHS) was interested in participating in this fellowship, because it is a great opportunity to advance current knowledge and skills in environmental public health tracking and to enhance the capacity to conduct related activities.

ADHS has tracked conditions and diseases that potentially have a relationship to environmental hazards and exposures such as birth defects, asthma, cancer and other chronic diseases. With the support from the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR), OEH has conducted activities in collecting exposure information for child and adult lead poisoning, pesticide poisoning as well as behavioral risk factors. OEH also evaluates environmental hazard data to determine potential health risks associated with site-specific exposures. However, ADHS has not had the capacity to link health outcome data, exposure data, and/or environmental data.

ADHS recently received funding under CDC’s Climate-Ready States and Cities Initiative to assess and plan to develop a climate change program. Under this cooperative agreement, ADHS proposed to focus on heat related mortalities and morbidities. ADHS identified a need to develop a mechanism for linking health outcome data and weather data.

---

<sup>1</sup> <http://healthyamericans.org/reports/files/healthgap.pdf>

<sup>2</sup> <http://ephtracking.cdc.gov/showHome.action>

Heat-related illness has been a concern in Arizona. From 1993 to 2002, the number of health-related death was three to seven times greater in Arizona than in the US overall (CDC 2005). However, in Arizona, we face different challenges in developing preventive strategies because we experience frequent heat events and have cooling devices in most indoor environments. Zack Guido of the University of Arizona also says “compared with more humid regions, the Southwest’s dry climate may make heat-related illness more likely because people don’t feel uncomfortable until problems such as dehydration have already started.”

Rising average annual temperatures, the urban heat island effects, and limited vegetation amplify the impact of the heat on the population in this area. According to Maricopa County’s 2008 Annual Report, annual heat-related and heat-caused deaths in Maricopa County have increased from 2001 to 2008, with peak years being in 2005 and 2006 (80 and 85 deaths respectively). In July 2005, a single heat wave caused 28 deaths in Maricopa County alone, which represented an excess heat-related mortality of 102% in comparison with the corresponding periods from 2000 to 2004 (Yip et al. 2008).

After the 2005 incident, the ADHS developed a Heat Emergency Response Plan to improve the response to heat event emergencies. ADHS has put efforts to anticipate and prepare for the effects of climate change to reduce the associated health burden which requires systemic ongoing efforts to identify and reduce risks of heat. This cannot be done without an effective public health tracking system in place.

## Activities

---

### *Site Visit – February 22<sup>nd</sup> & 23<sup>rd</sup>, 2011*

ADHS visited California’s EPHT Program in February, 2011. ADHS spent 1½ days in California with host state staff. Arizona was matched to California because of the mutual interest in heat related mortality and morbidity.

#### **Day 1:**

##### Introductions and Overview (all staff)

- Introductions
- Overview of Arizona’s proposed pilot project and discussion of goals
- Overview of the California Tracking Program (Paul)
  - History
  - Program organization
  - Lessons learned: successes and challenges

##### Web Portal Demonstration (Gala, Craig)

- Overview of portal, data and query system
- CA Approaches to secure and public portal
- Mapping applications (GIS)
- Other Portal Tools
- Challenges, Limitations, Future plans

#### Information Technology/ Data Management (Craig, Gala, Eric)

- Overview of IT Infrastructure
- Data sharing, agreements, and challenges surrounding data acquisition
  - Establishing partnerships (how to identify and obtain buy-in from data stewards)
- Data management
  - Linking environmental with human health data
- Metadata creation and submission
- Integrating data into the National Tracking Network

#### Surveillance and Research (Eric, Gala)

- Research and linkage for research support – work with APEX, Helene, Hypospadias, others
- Autism research
- Breast Cancer Mapping

#### Communications and Outreach (Michelle, Alexa)

- Web Portal Communications
- Outreach through Newsletter, Presentations
- Plans for targeting specific stakeholder audiences

#### Stakeholder Input (Gala)

- Working with the Tracking Implementation Advisory Group

#### ***Day 2:***

##### Arizona's Climate Change work

- Heat wave indicator development
- Data availability, needs

##### California's Climate Change work (Paul, Max)

- Heat Wave morbidity and mortality analysis
- SEHIC, CDC climate change indicator development
- ASTHO Climate Change projects
- HIA
- Current plans for vulnerability assessment

##### Other CDPH Climate Change analysis (Martha, Sumi)

##### Reviewing Arizona's plans for heat wave morbidity/mortality analysis

- Modeling the EPHTN architecture around Arizona's needs
  - Developing a customized approach
  - Discussions, brainstorming, next steps

ADHS is extremely grateful to California's EPHT Program for their hospitality as well as their willingness to take time to share their knowledge and expertise with ADHS staff. The site visit was another invaluable piece to this fellowship program to help Arizona understand the NEPHT Network in greater detail. ADHS and CEPHT exchanged information and ideas that helped ADHS to develop methods and approaches to evaluate health related mortality and morbidity in Arizona.

## *Environmental Public Health Tracking Workshop – Bridging the Gap*

*April 26-28, 2011; New York City, New York*

Arizona participated in the workshop in New York City to learn about the work other states are doing in regards to Environmental Public Health Tracking. Plenary Session topics included: News and Updates; Results from Five Years of Tracking; Academic Partners of Excellence; A look into Health and Mapping; CDC National Portal Preview; Health Impacts Assessment; Biomonitoring Initiatives; and National Weather Service. In addition to the plenary sessions, ADHS participated in several concurrent or breakout sessions: Content Working Groups (CWG)– Air, Lead, and Vital Statistics as well as the Climate breakout session.

ADHS found that participation in the workshop was an invaluable experience to learn from the CDC, partners (like ASTHO), and other states. The workshop covered successes, lessons learned and more challenges that still need to be worked out. The Network is a work in progress, and it was exciting to see how each partner has tackled various aspects to build the National Environmental Public Health Tracking Network into what it is today. Each person brought a unique perspective, and the workshop was a media where experts could collaborate and find solutions to enhance the network.

### *Pilot Project*

Recently, OEH proposed to develop a Climate Change Program that can develop and enhance health capacity and adaptations to reduce human health effects of climate change. The initial efforts will focus on preventing heat-related illnesses and deaths. This proposal is awarded by the CDC. One of the proposed activities under this cooperative agreement is to enhance the current surveillance system, and be able to link health outcome data with weather data to identify risk factors and vulnerable populations.

ADHS has identified a data gap in understanding the scope, trends, and risk factors of heat related morbidity in Arizona. Until now, significant attention has been placed on surveillance of heat related deaths in Arizona. Linking health outcome and environmental data, will allow us to better understand the elements surrounding heat related mortality and morbidity and to identify risk factors and targets of intervention.

Goals of the pilot project were to 1) gain an in-depth understanding in the key tracking techniques and IT infrastructure. In addition, with this opportunity, 2) build peer networks and be a part of the national tracking conversation to enhance our capacity to integrating environmental and epidemiological data and 3) to identify ways to improve public health with better information.

### *Surveillance*

Heat related mortality surveillance in Maricopa County, Arizona has been strong. However, only limited efforts are used to address the heat-related illnesses. Hence, OEH plans to identify local at-risk populations, and characterize all-cause and cause-specific excess morbidity/mortality in Maricopa

County, Arizona. This will be completed by looking at hospital discharge data on and following excessive heat events to determine which factors significantly influence rates of heat related illness.

As part of this pilot project, ADHS reviewed available databases, identified useful fields/information, explored barriers and issues, and began to link databases. After talking to ASTHO, Maricopa County, and California and data owners at ADHS, Arizona learned of many barriers to using hospital discharge data. (1) The hospital discharge database is not nearly as “clean” as the death certificates database. (2) Heat illness is believed to be under-reported for a variety of reasons. (3) There is no universal method for determining heat illnesses using hospital discharge data. (4) “Excess morbidity and mortality associated with heat waves go beyond that classified formally as ‘heat related.’”(Knowlton et al.) Arizona did learn of several methods to attempt to overcome these barriers. (1) Look at total hospital admissions on high heat days. (2) Look at codes for illnesses that are known to be affected by heat:

- All internal causes: ICD-9-CM codes 001-799.9
- Diabetes mellitus: 250
- Cardiovascular diseases: 390-398, 402,404-429, 440-448
- Acute myocardial infarction: MI; 410
- Cerebrovascular diseases: 430-438
- Respiratory illnesses: 460-519
- Nephritis and nephritic syndrome and nephrosis: 580-589
- Acute renal failure: 584
- Accidents caused by excessive heat: 900
- Heat related effects: 992

Because of the barriers in using this data, ADHS has not yet completed linking hospital discharge data and weather data. ADHS expects to be able to link hospital discharge data with weather data in the coming months. Once hospital discharge data has been linked to weather data, a report will be compiled to discuss the findings and posted on the website.

ADHS has pulled all heat related or heat caused deaths in Arizona from 2005 to 2010 using ICD-10 codes X30, T67, and T67.0, and is waiting on the requested weather data from the National Weather Service. ADHS will link weather data corresponding to the city where the death or illness occurred to the death or illness record, respectively. Weather data will include high temperature, low temperature, diurnal temperature, issuance of high heat alerts/warnings, precipitation, humidity, heat index, ozone, and particulate matter. Obtaining the weather data is delayed, because some of the cities with deaths do not have weather stations to record all of the above desired information. The National Weather Service is using a model to provide an estimate to ADHS for cities that do not collect the requested data.

## Conclusions

---

Currently, the existing environmental hazard, exposure and disease tracking systems in Arizona are not linked together, thus it is difficult to study and monitor relationship among hazards, exposures, and health effects. Through this fellowship program, ADHS staff was able to gain first-hand experience from other states to explore our ways to develop a system that link environmental and human health data and integrate into the national tracking network. The ADHS fellow built partnerships with other states. The trained fellow will be the lead in conducting environmental health tracking activities for our agency.

At the end of the project, ADHS was able to identify data gaps and increase understanding of the environmental public health tracking systems. Through the information gathered from the literature review, conversations with Maricopa County and California Department of Public Health, ADHS has a better understanding of implementing a tracking system for heat related mortality and morbidity.

## Moving forward

---

ADHS will use the enhanced surveillance to identify vulnerable populations and implement a more efficient educational campaign and specific interventions directed to high risk populations, possibly certain occupations or hobbies. Future possible activities include: tying health outcome data and weather data into built environment data, perhaps through partnerships with the Arizona State University.

The information gained from this fellowship will not only help ADHS develop an Environmental Public Health Tracking Program, but will also assist in the Cooperative Agreement with CDC entitled “Developing Public Health Capacity and Adaptations to Reduce Human Health Effects of Climate Change.”

ADHS has enhanced current and built many new partnerships over the past few months to address topics related to extreme heat events and climate change. These partners include internal partners such as vital statistics, vector borne Diseases, injury prevention, emergency preparedness, refugee health, homeless outreach, and external partners such as the Arizona State University, the National Weather Service, Maricopa County, Healthology, school nurses, National Park Service, Arizona Department of Environmental Quality, and the Salvation Army.

## References

CDC (2005) Heat-related mortality – Arizona, 1993-2002, and the United States 1979-2002. MMWR 54: 628-630

Yip FY, WD Flanders, A Wolkin, D Engelthaler, W Humble, A Neri, L Lewis, L Backer, C Rubin. (2008)  
The impact of excess heat events in Maricopa County, Arizona: 2000-2005. *Int J Biometeorol*  
52: 765-772

Knowlton, K., Rotkin-Ellman, M., King, G., Margolis, H. G., Smith, D., Solomon, G., Trent, R., & English,  
P. The 2006 California Heat Wave: Impacts on Hospitalizations and Emergency Department  
Visits. *Environmental Health Perspectives*. 117(1), 61-67.