

Surviving Maricopa County's Extreme Heat: Update on Mortality and Morbidity Associated with Environmental Heat

*Vjollca Berisha, MD, MPH National Energy & Utility Affordability Coalition, 2018
Annual Conference, Phoenix, Arizona*

Outline



Ø Background Information

Ø Environmental Heat Injury/Death in Maricopa County

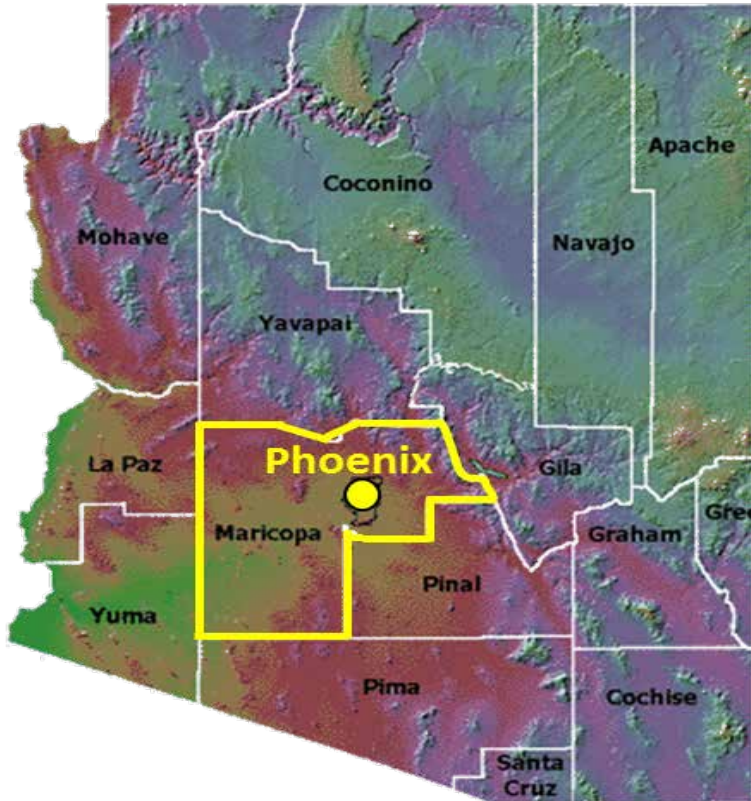
Ø Special Studies

Ø Results

Maricopa County, Arizona



One of the largest urban centers to experience the nation's most extreme heat



Typical year:

Environmental temperatures $\geq 100^{\circ}\text{F}$

Start: mid-May
End: 1st week October

Days where max. temp $\geq 110^{\circ}\text{F}$ (119°F)

26 days (average)

Days where min. temp $\geq 90^{\circ}\text{F}$ (95°F)

13 days (average)

Excessive Heat Warnings in Maricopa County (2006-2017)



56

Excessive Heat Warnings Events Issued

179

Days with Excessive Heat

268

Number of Deaths During Excessive Heat Warnings

25%

Of Total Heat Related Deaths have occurred during Excessive Heat Warning Days

Months: May, June, July, August, September

Silent Killer

Lack of public
recognition

Ø No damage to
infrastructure
(silent killer)

Ø Many deaths go
unreported,
unrecognized

Every heat associated
death is preventable!

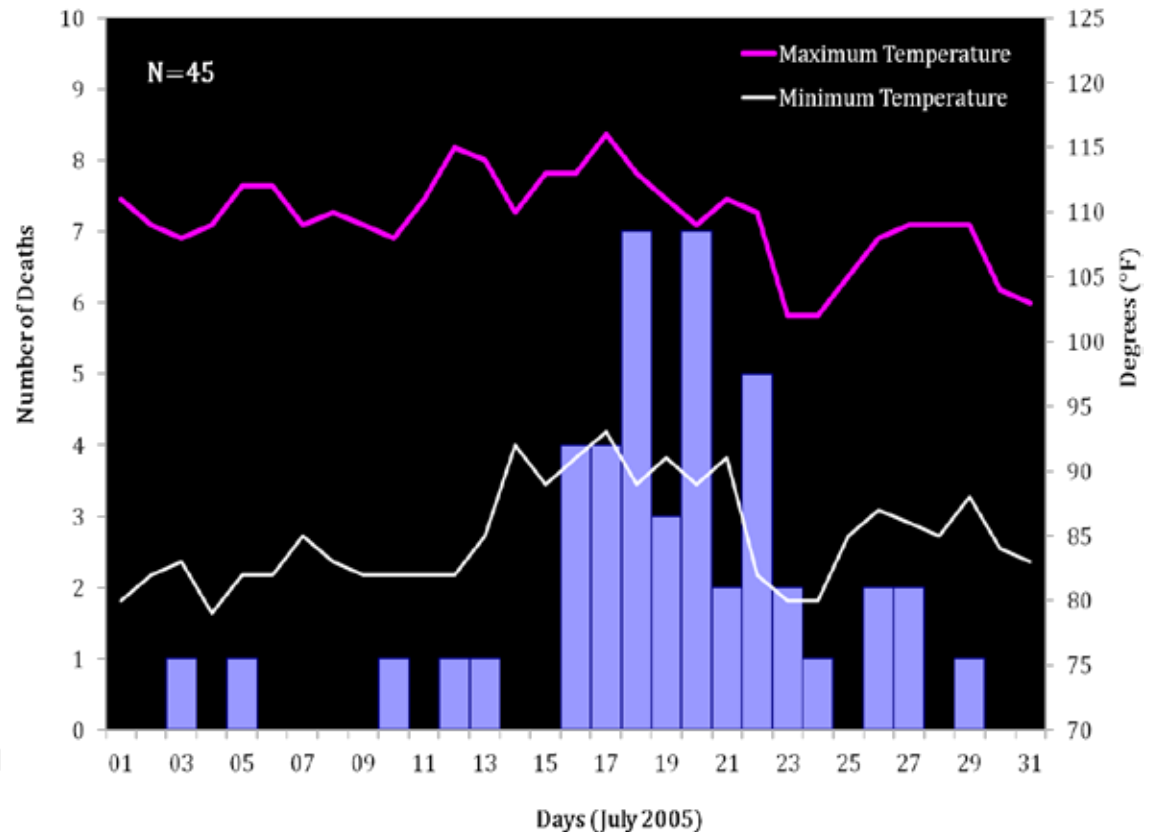


Enhanced Heat Surveillance



- Ø Exceptionally high temperatures (July, 2005)
- Ø Media Reports:
 - § "Many heat deaths may go uncounted"
 - § "Heat deaths catch officials off-guard"
 - § "Heat wave claims 18 lives in 5 days"
- Ø No surveillance system for heat-associated deaths in place

Heat-Associated Deaths and Maximum/Minimum Temperatures, July 2005



MCDPH IMPLEMENTED A SYSTEM FOR TRACKING HEAT-ASSOCIATED DEATHS IN 2006

Public Health: Vision and Mission



Vision:

“A healthy and safe community”

Mission:

“To protect and promote the health and well-being of Maricopa County residents and visitors”

Extreme Heat
HEAT AND HEALTH
Future Agriculture Healthy Climate Change
Sustainable Education Air Environment Heat Injury
Death Pollution
Soil Literacy Water

Data Sources



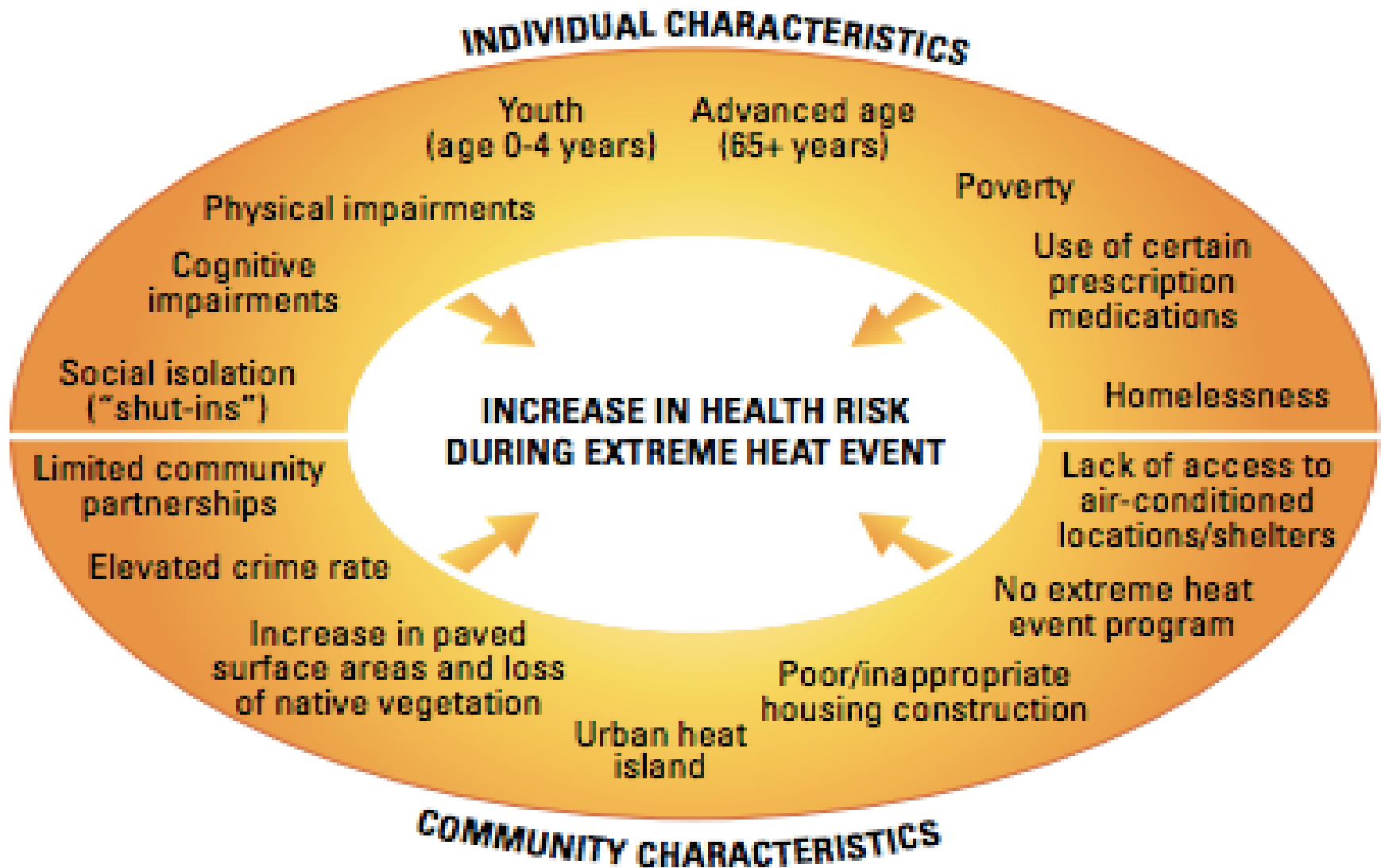
Ø Traditional Data Sources

- § Death certificates
- § Medical examiner data (PRODs)
- § Hospital discharge data (HDD)
- § Syndromic Surveillance
 - Essence

HEAT MORTALITY & MORBIDITY



Who is at Risk?



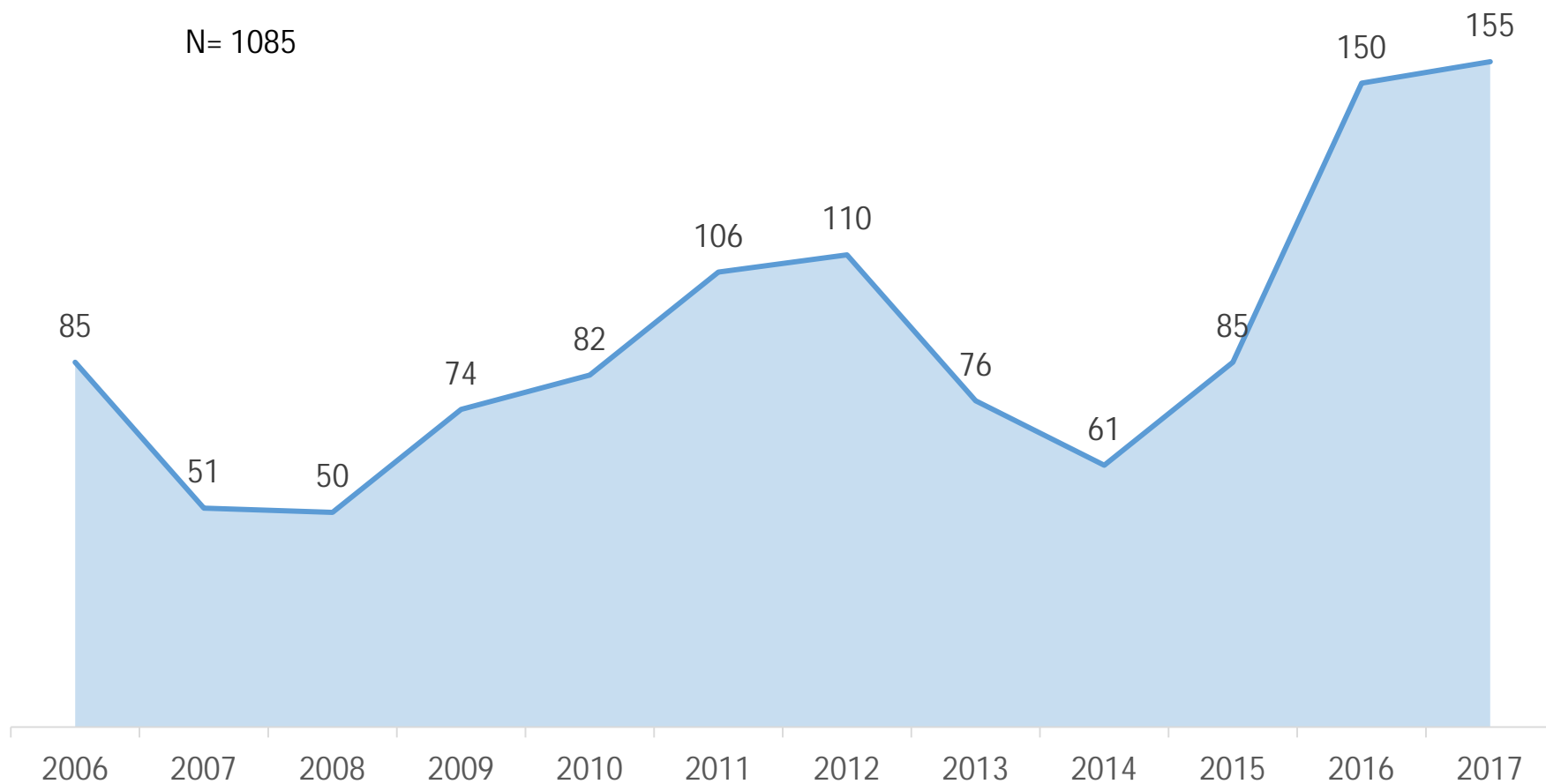


Help Create a Healthy Community...



Maricopa County Heat Statistics

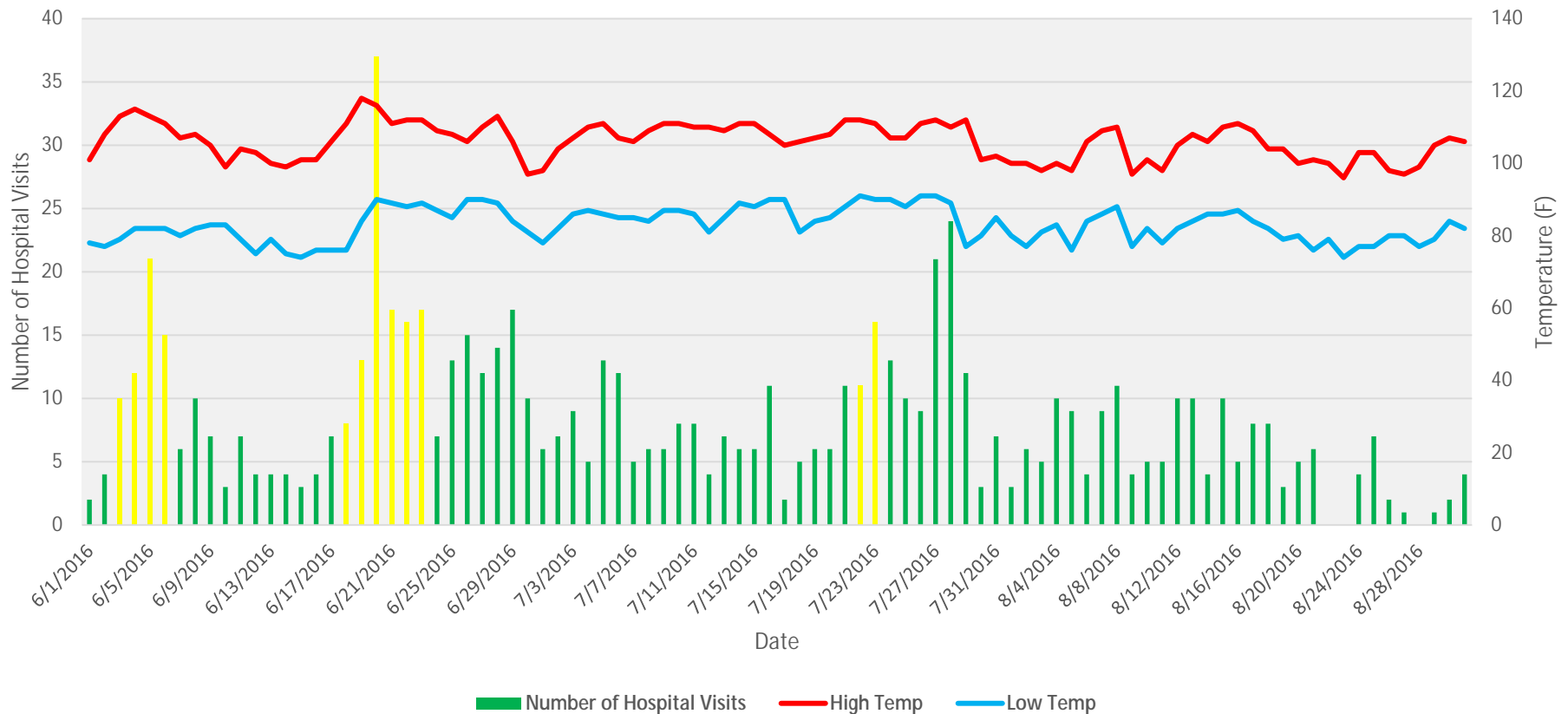
Frequency of Heat Associated Deaths By Year, Maricopa County (2006-2017)



Environmental Heat Associated Emergency Department Visits, Maricopa County 2016



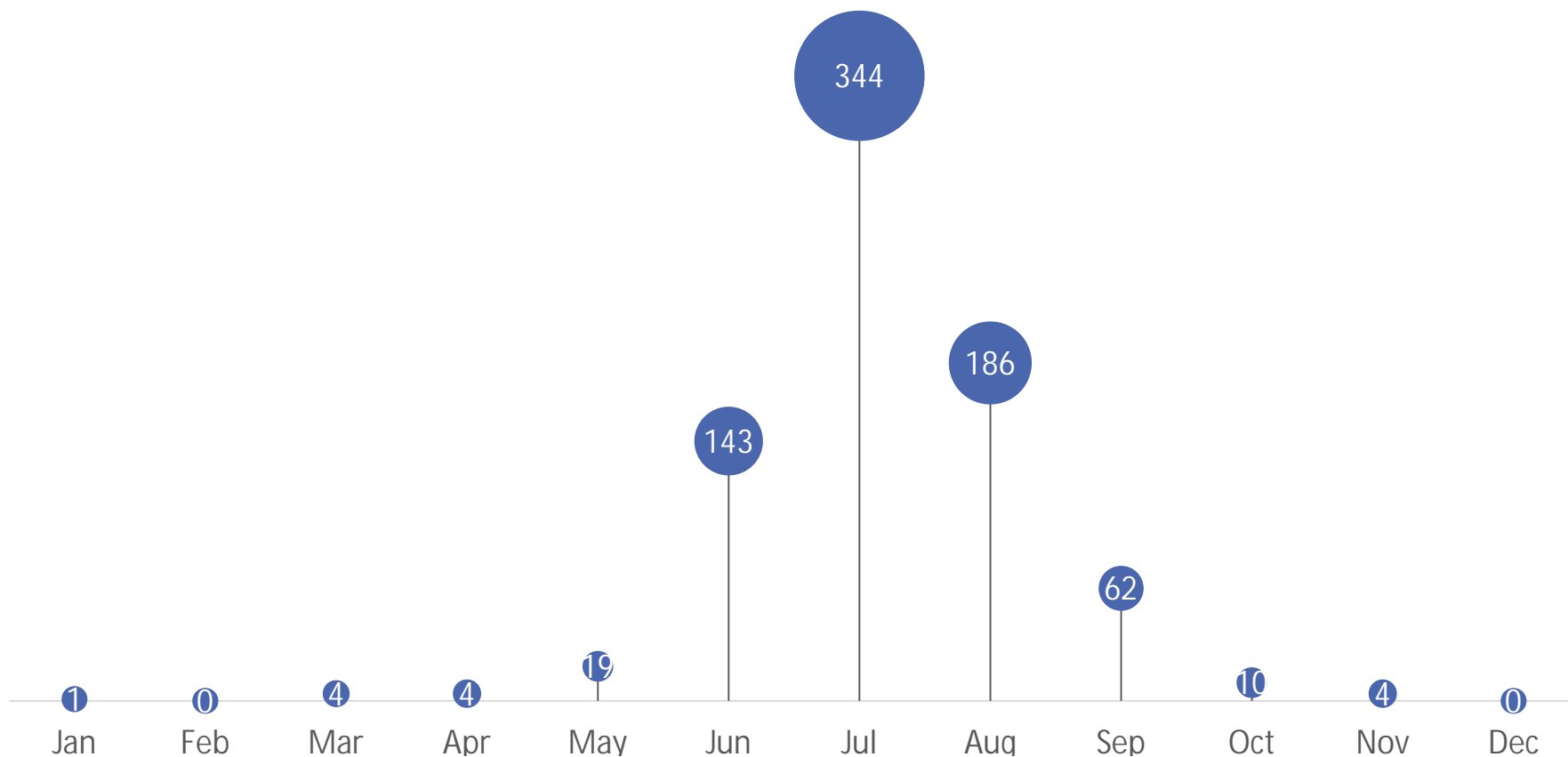
Heat Associated Illnesses by Day (N=755), Maricopa County 2016



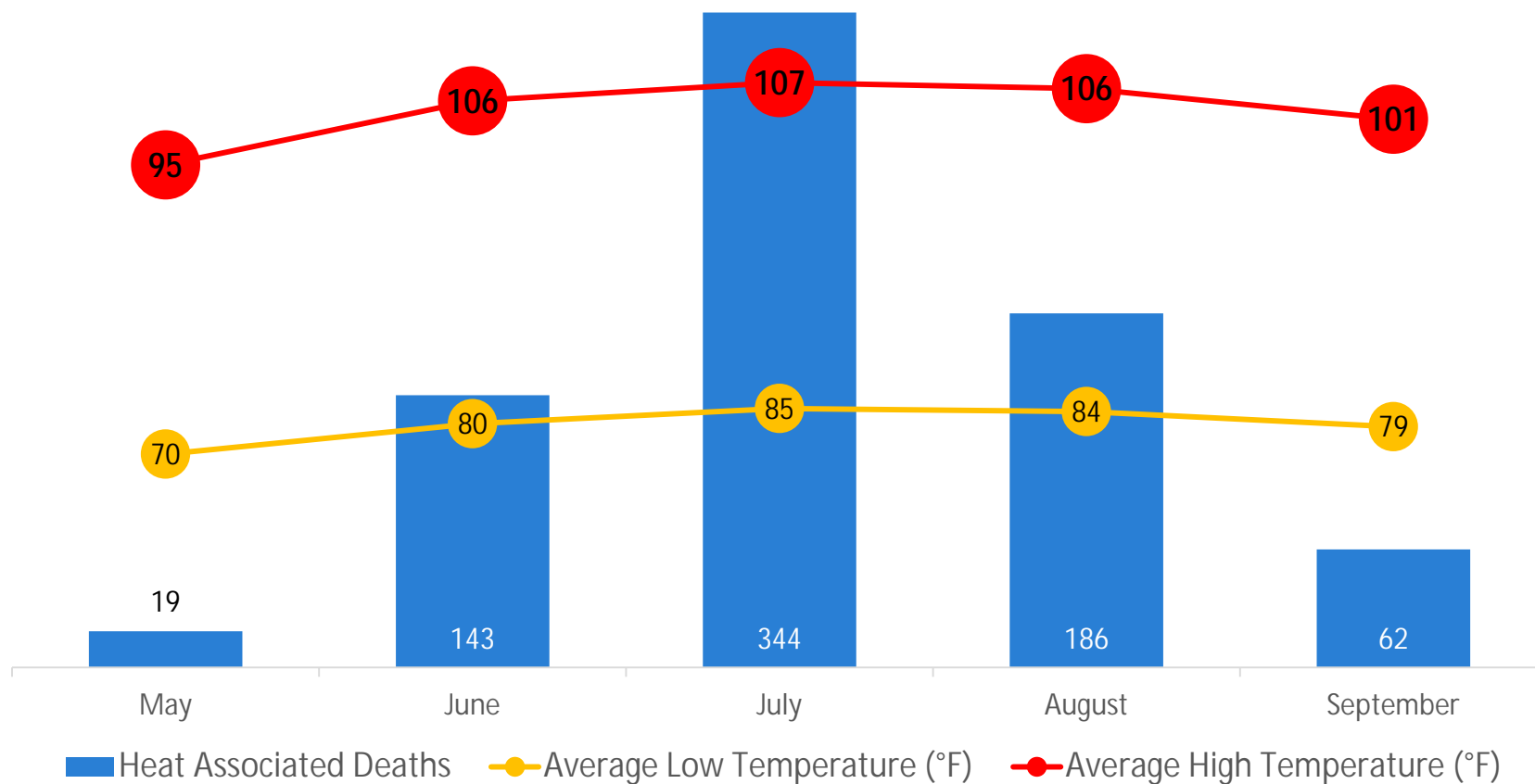
** Yellow bars indicate days with Excessive Heat Warning and Illness occurrence in these days

Source of Data: National Syndromic Surveillance Program – BioSense Platform (12 Maricopa County Hospitals)

Heat-Associated Deaths by Month, Maricopa County

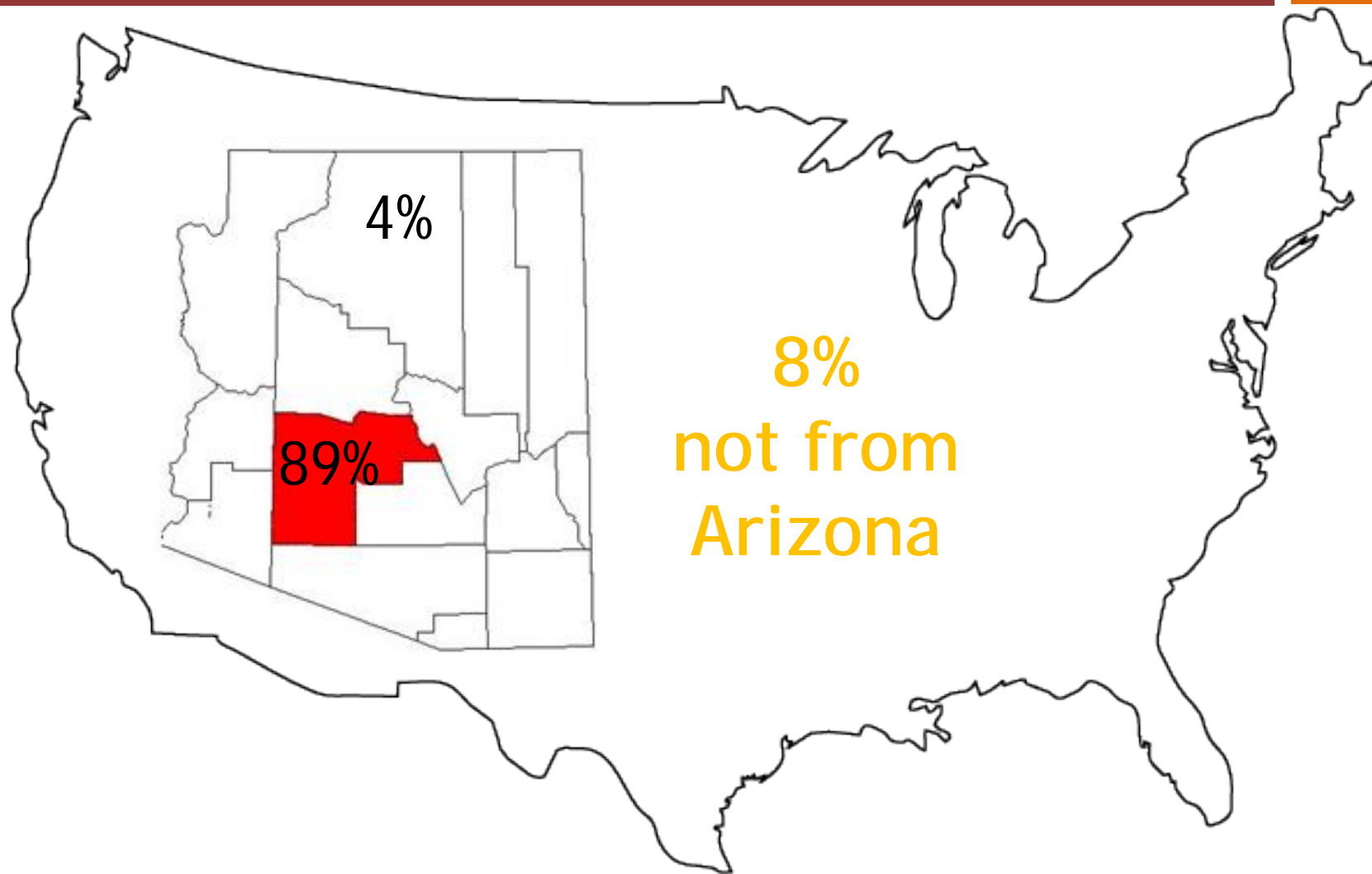


Temperatures and Heat Deaths, Maricopa County

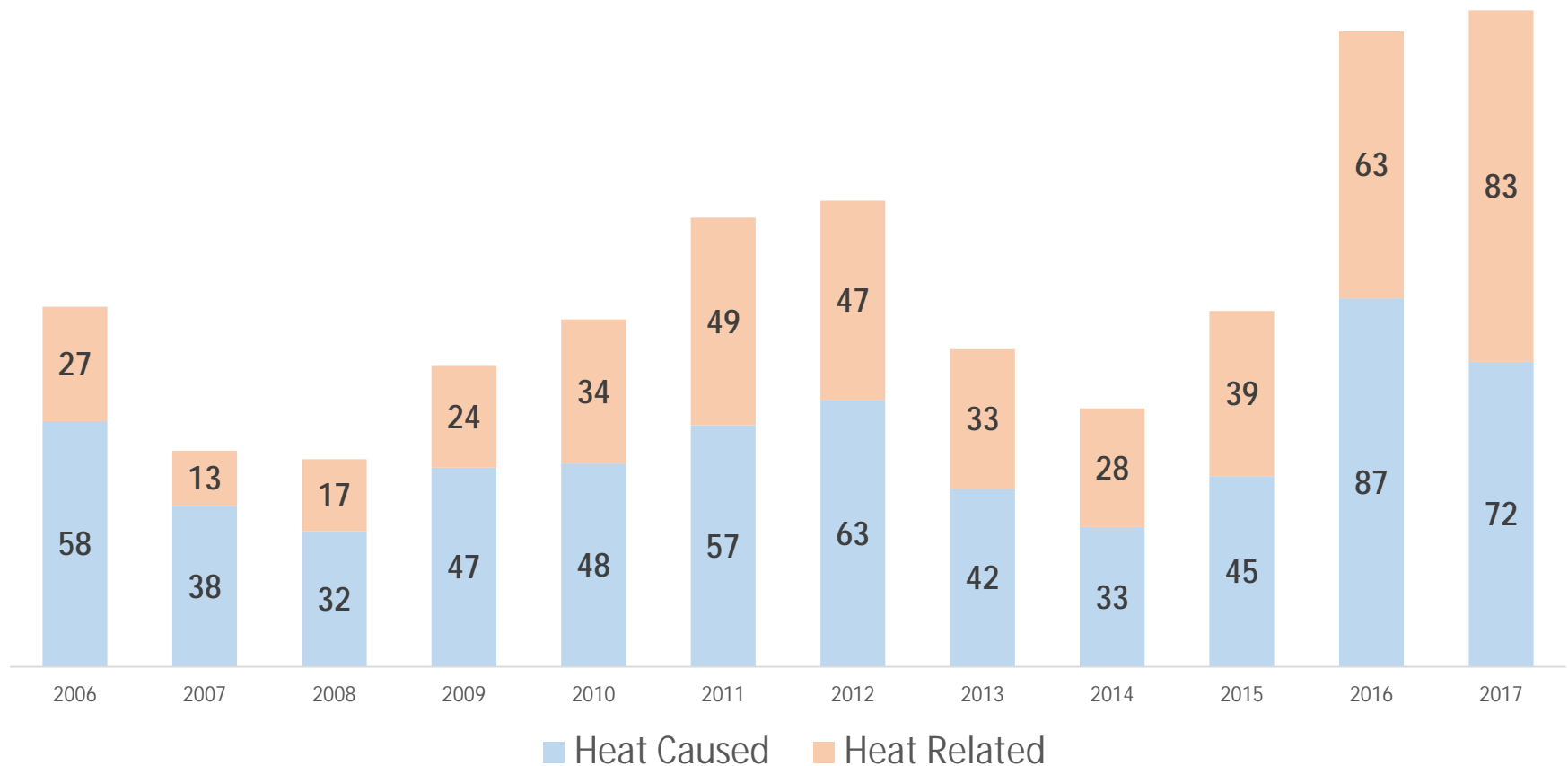




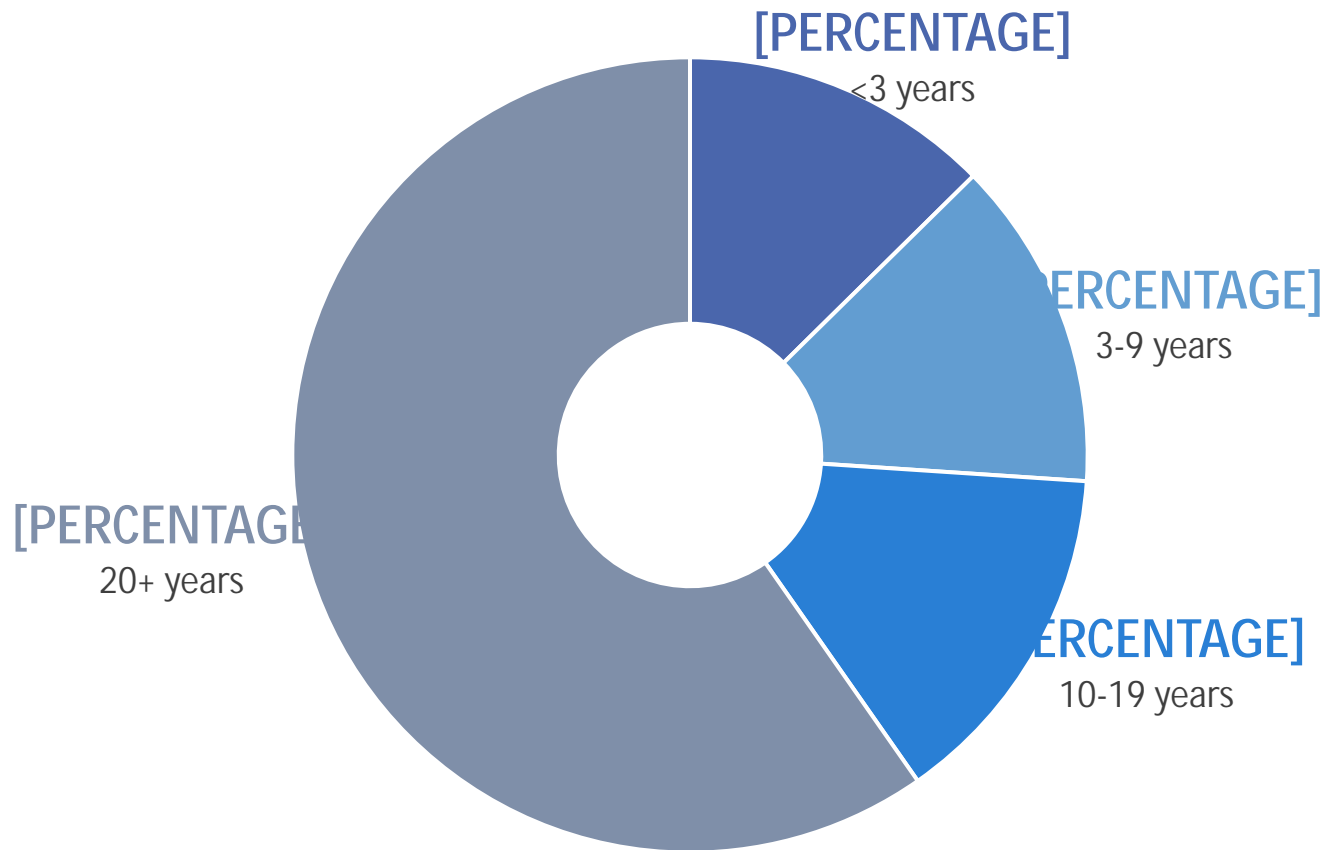
Heat Associated Deaths by Residency



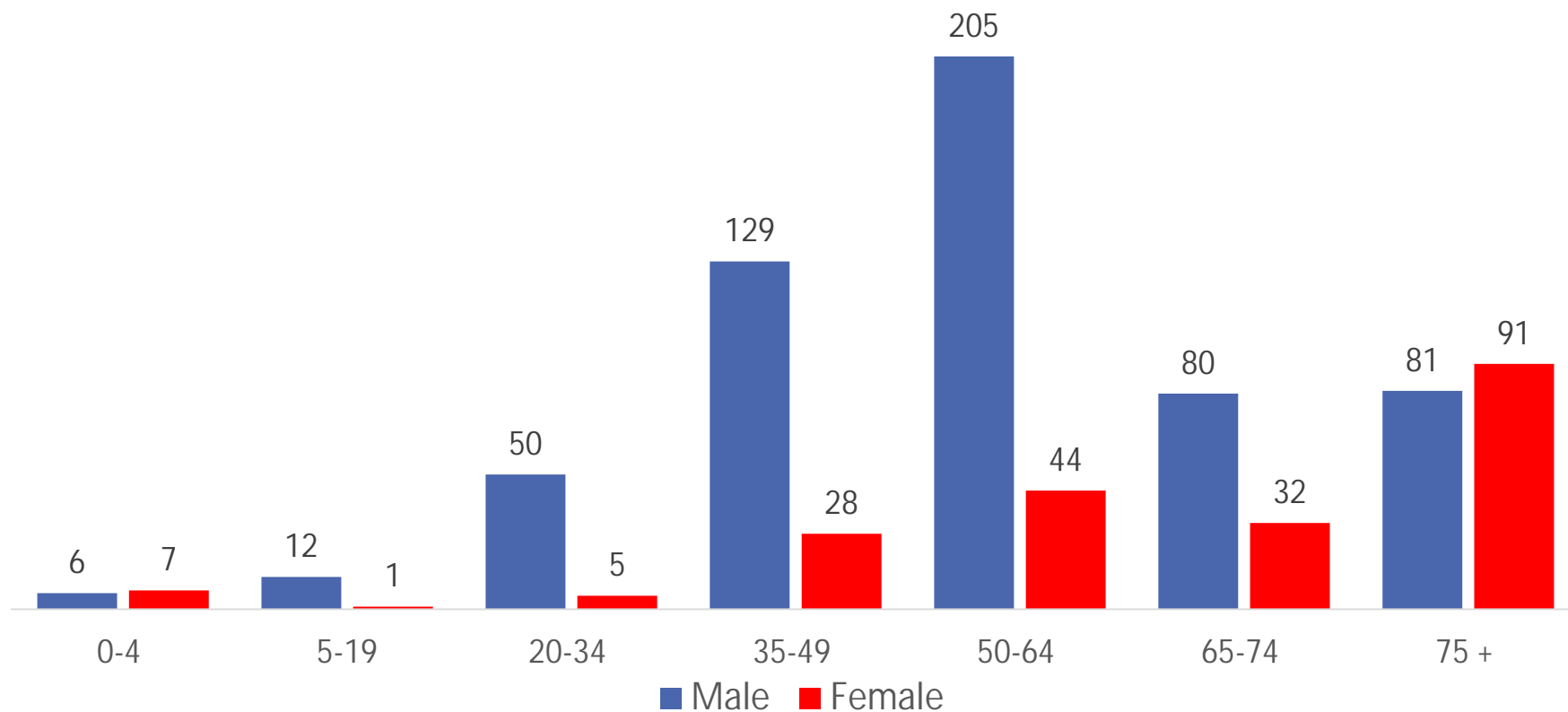
Fifty-eight Percent of Heat-associated deaths since 2006 have been classified as Heat Caused



All People are at Risk of Heat Related Deaths Regardless How Long Have Been Living in Maricopa County

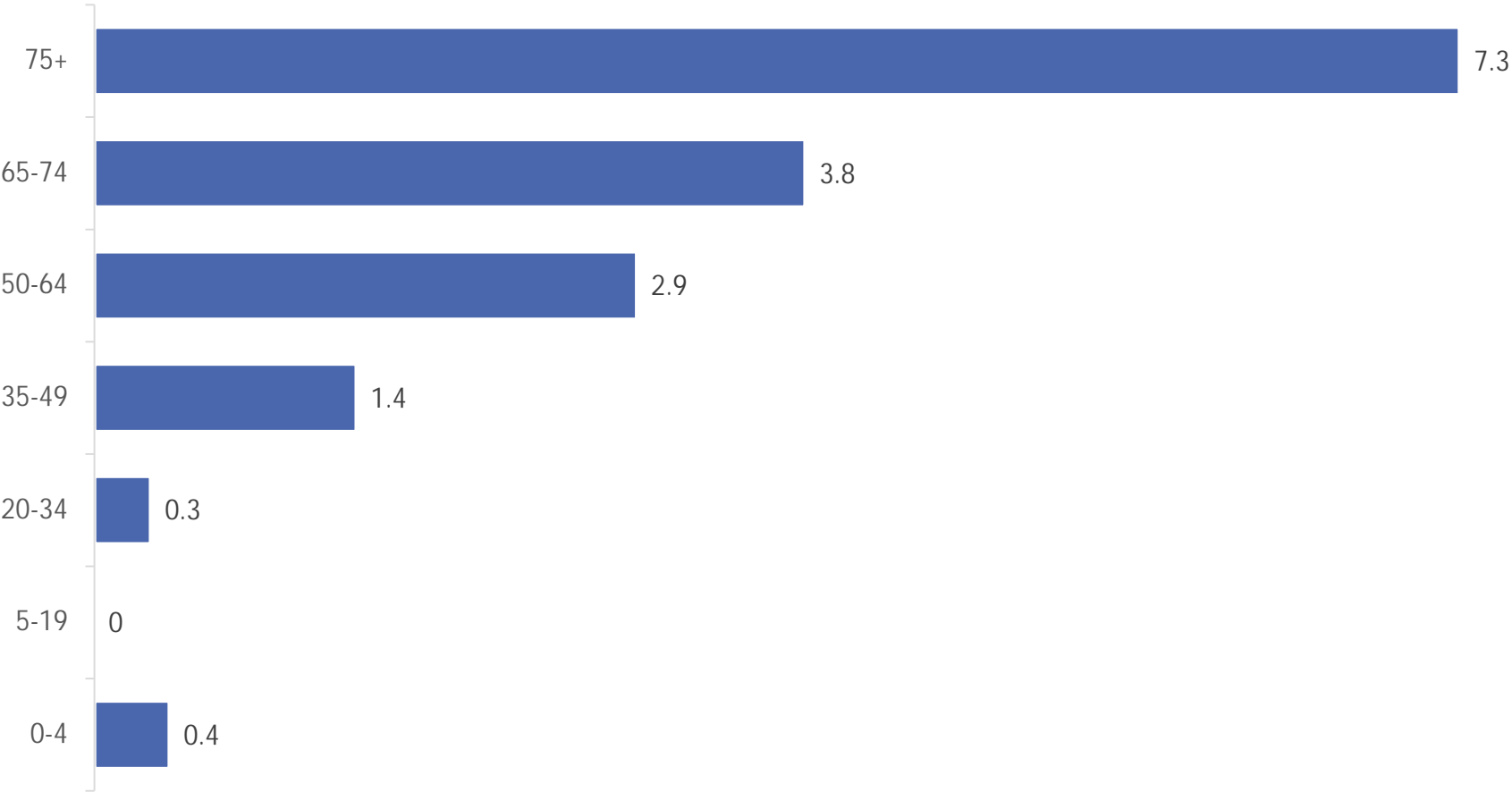


Heat Associated Deaths by Gender and Age Group, Maricopa County



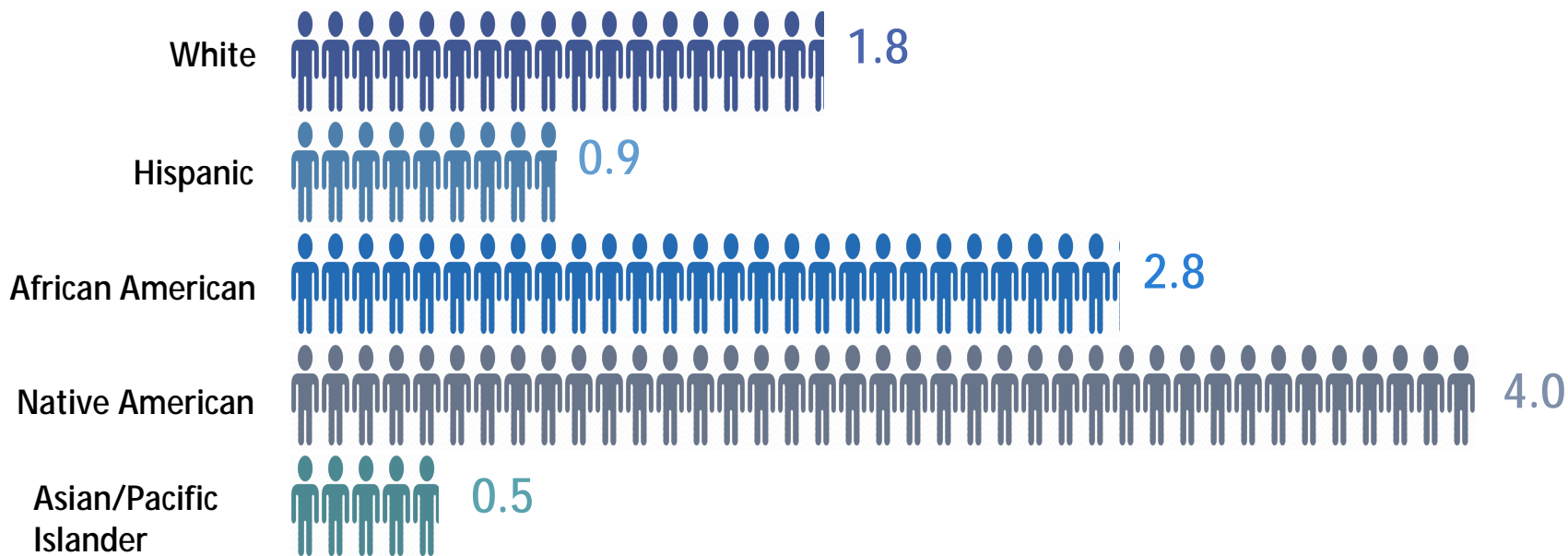


Death Rate by Age per 100,000 residents

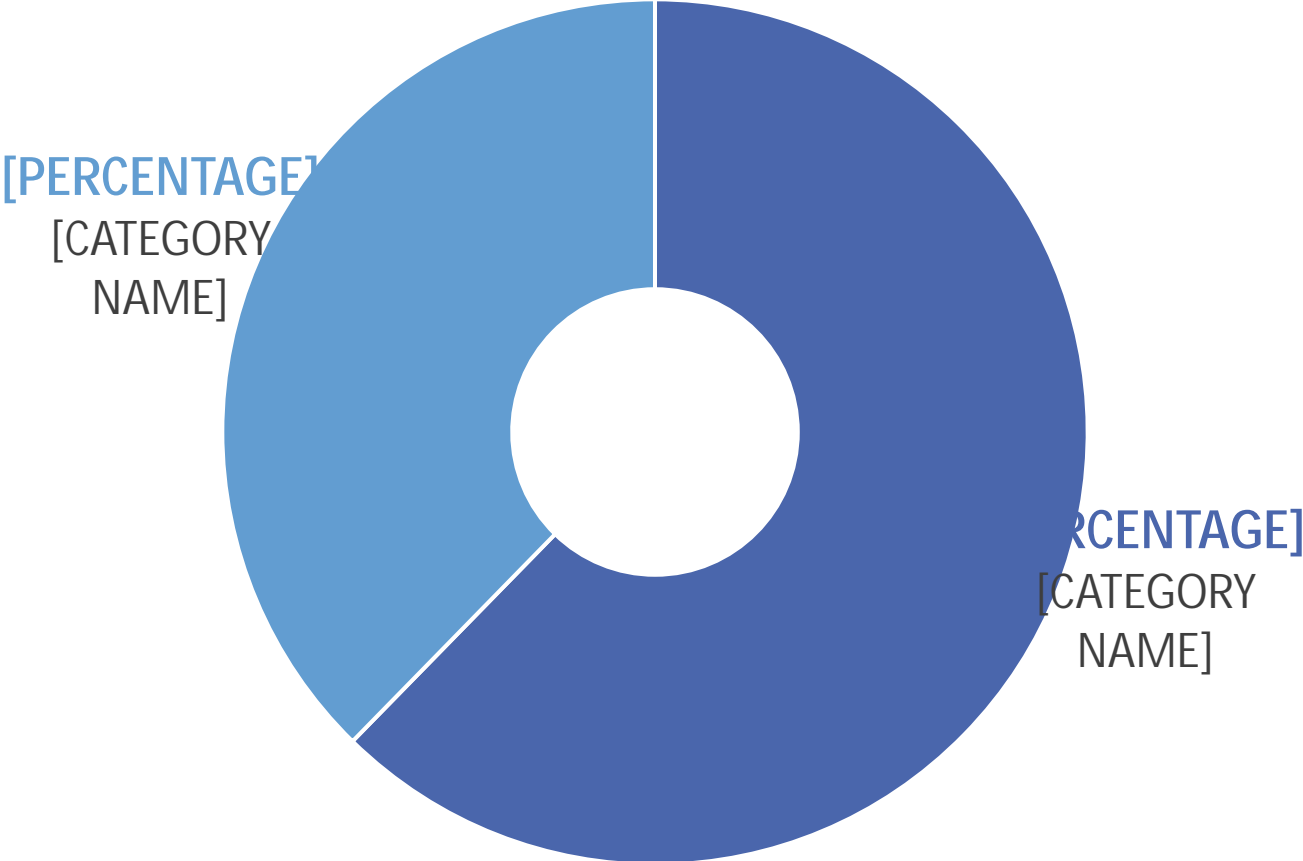




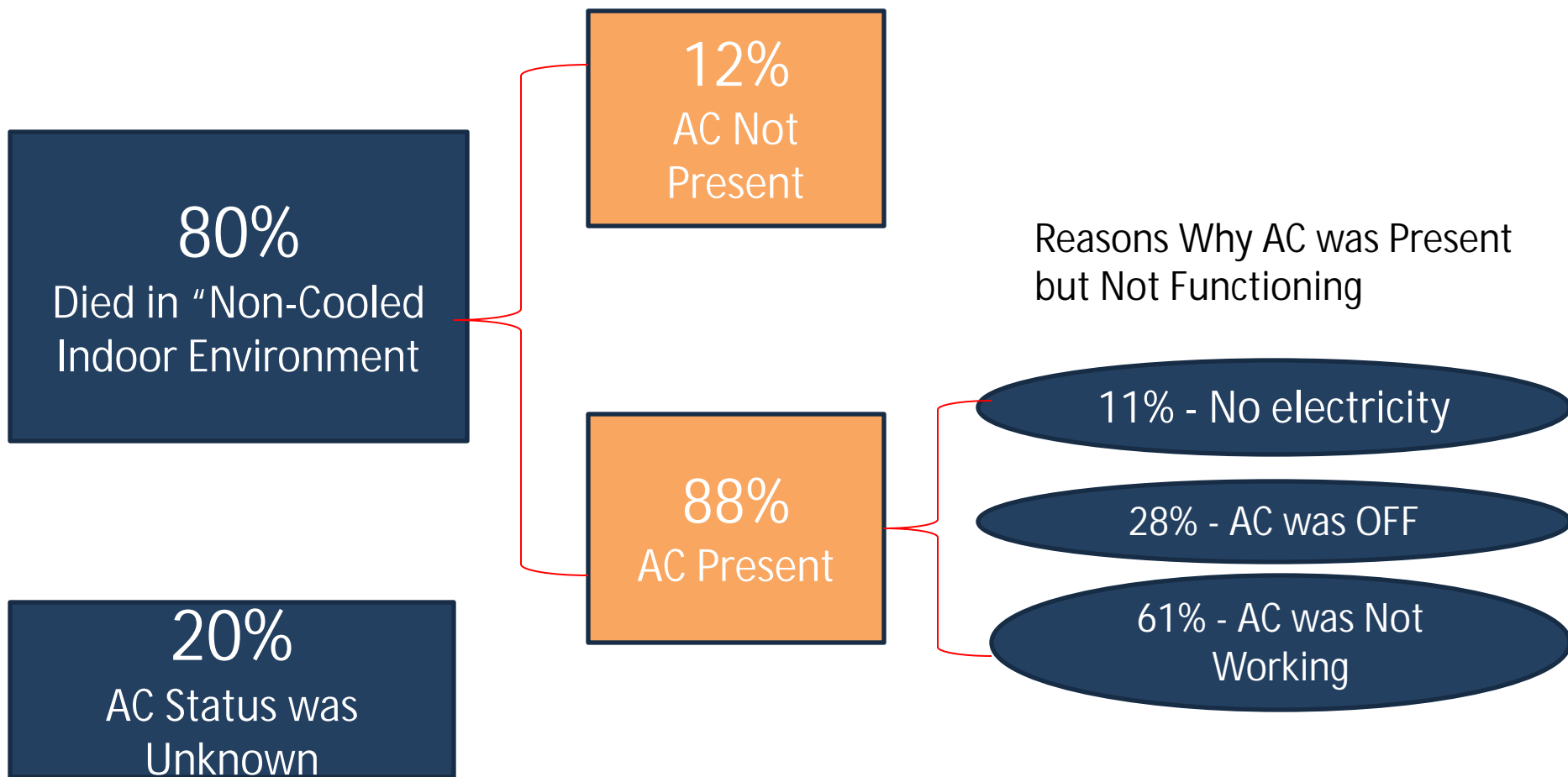
Heat Death Rates by Race/Ethnicity



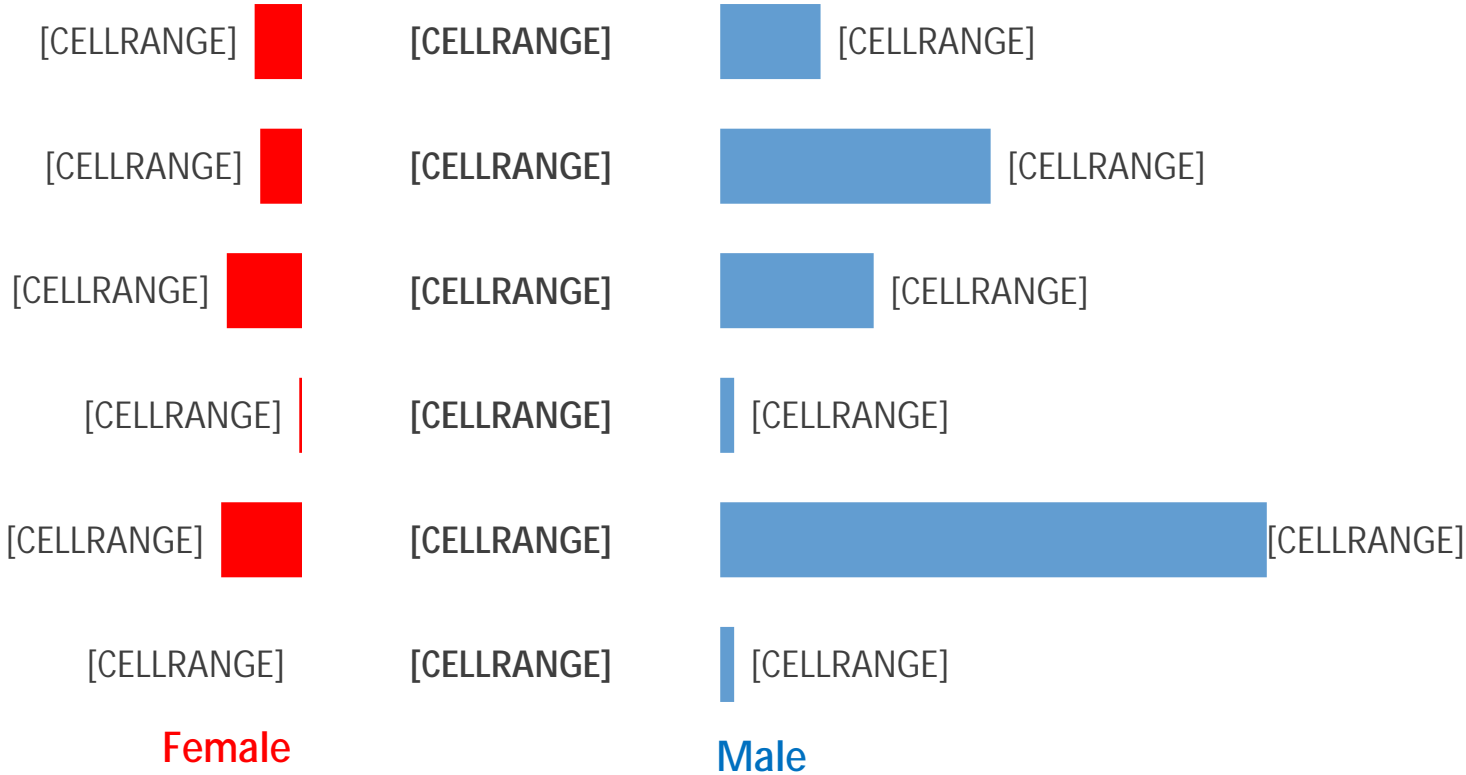
Heat Associated Deaths by Place of Injury, Maricopa County



Air Conditioning Status for Indoor Heat Deaths



Outdoor Heat Associated Deaths by Place of Injury, Maricopa County

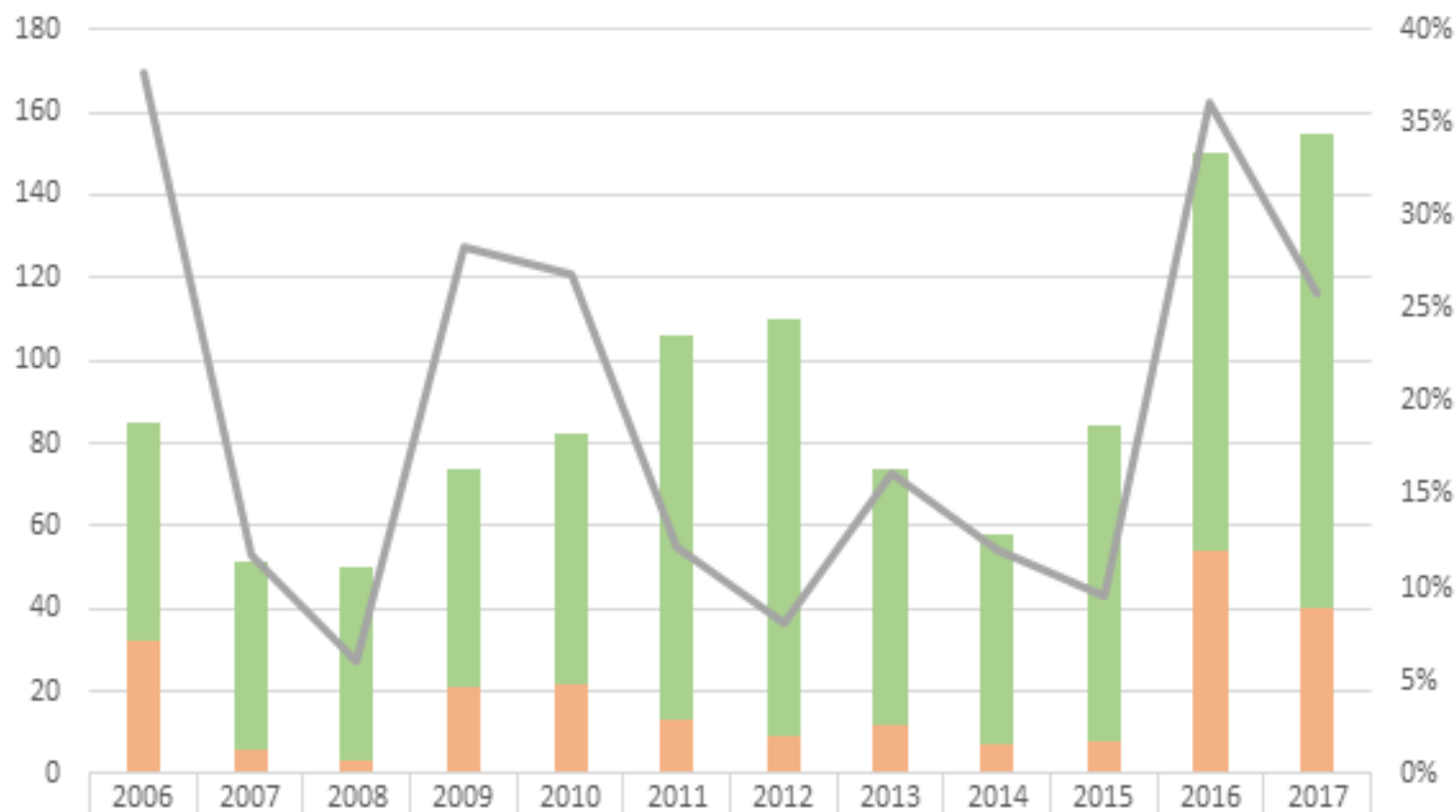




A total of 53 people died in a car due to heat. **11** of these people were children between the ages of 0 and 4, and **31** were between the ages of 35 and 64.



Heat Deaths among Homeless, Maricopa County, 2006-2017



Non-Homeless	53	45	47	53	60	93	101	62	51	76	96	115
Homeless	32	6	3	21	22	13	9	12	7	8	54	40
Percent Homeless	38%	12%	6%	28%	27%	12%	8%	16%	12%	10%	36%	26%

Evaluation of Cooling Centers in Maricopa County, 2014



Maricopa County Special Studies



Problem Statement

- For several years MCDPH explored the possibility of evaluating the HRN cooling centers
- In 2014, new collaborations were developed between to evaluate the cooling center program.





Purpose and Objectives

- ∅ The purpose of this project was to further understand the utilization patterns of the Cooling Centers, services offered, and opportunities for optimizing locations.

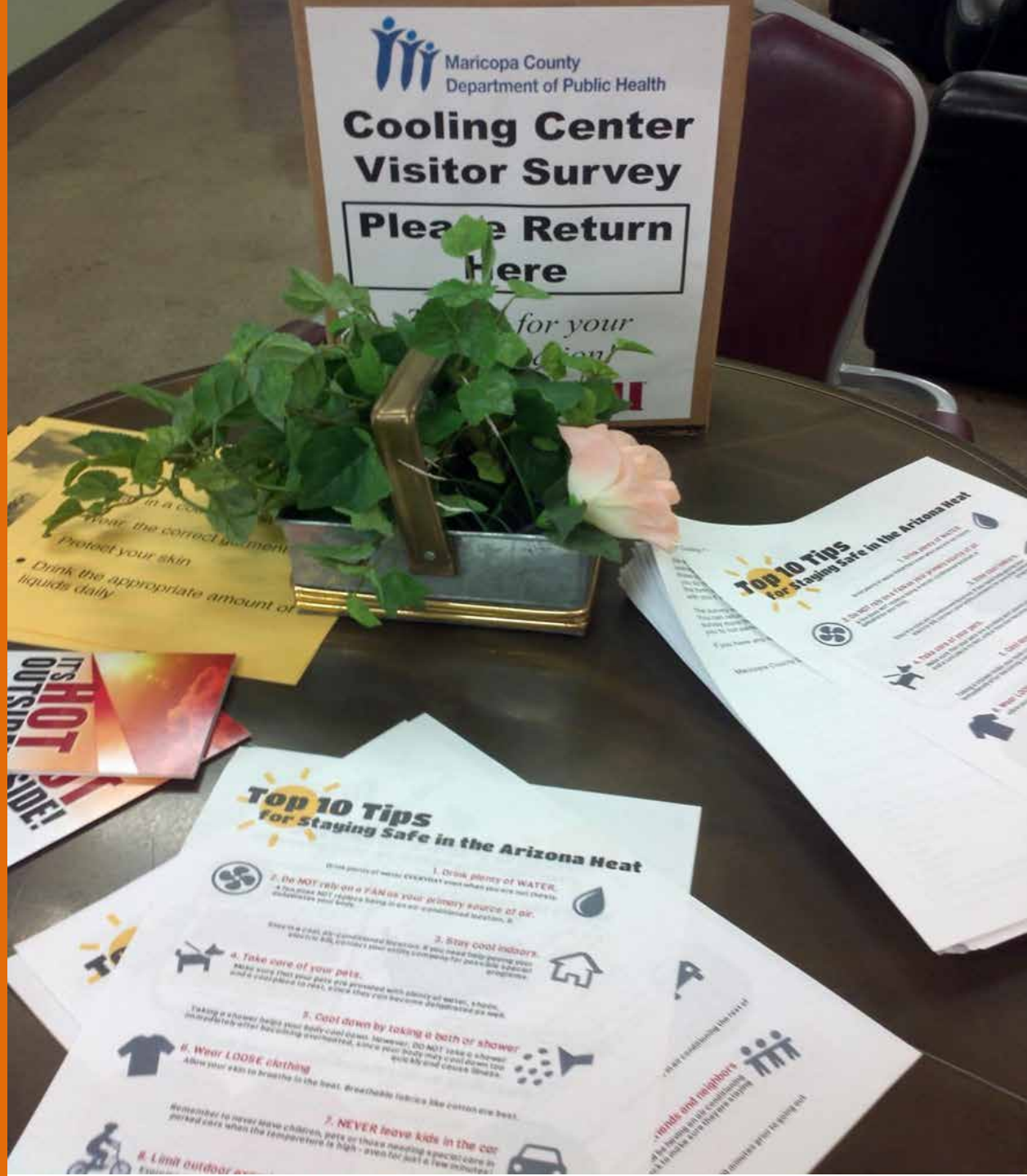
- ∅ Main Objectives:
 1. Identify the main demographic characteristics of individuals visiting the cooling centers
 2. Identify the geographic locations of under/over used cooling centers
 3. Set up a framework that will allow for conducting similar evaluation projects (ex: energy assistance programs, etc.)
 4. Identify the most effective methods in communicating important heat-related messages



Methodology

- ∅ Three surveys were designed and teams were deployed for distribution.
 - **Visitor Survey:** help to gain a better understanding of the role that the Heat Relief Network plays in supporting these at-risk individuals.
 - **Facility Manager Interview:** help to gain a better understanding of the Cooling Center capacity, utilization, costs, and best practices
 - **Facility Data Collection (Observational):** help to gain a better understanding of the facility layout, visibility, accessibility, etc.
- ∅ Qualitative and quantitative data collected
- ∅ Site visits were also used to distribute educational materials and any other relevant information.

Final Results:
Managerial,
Visitor and
Observational
Survey





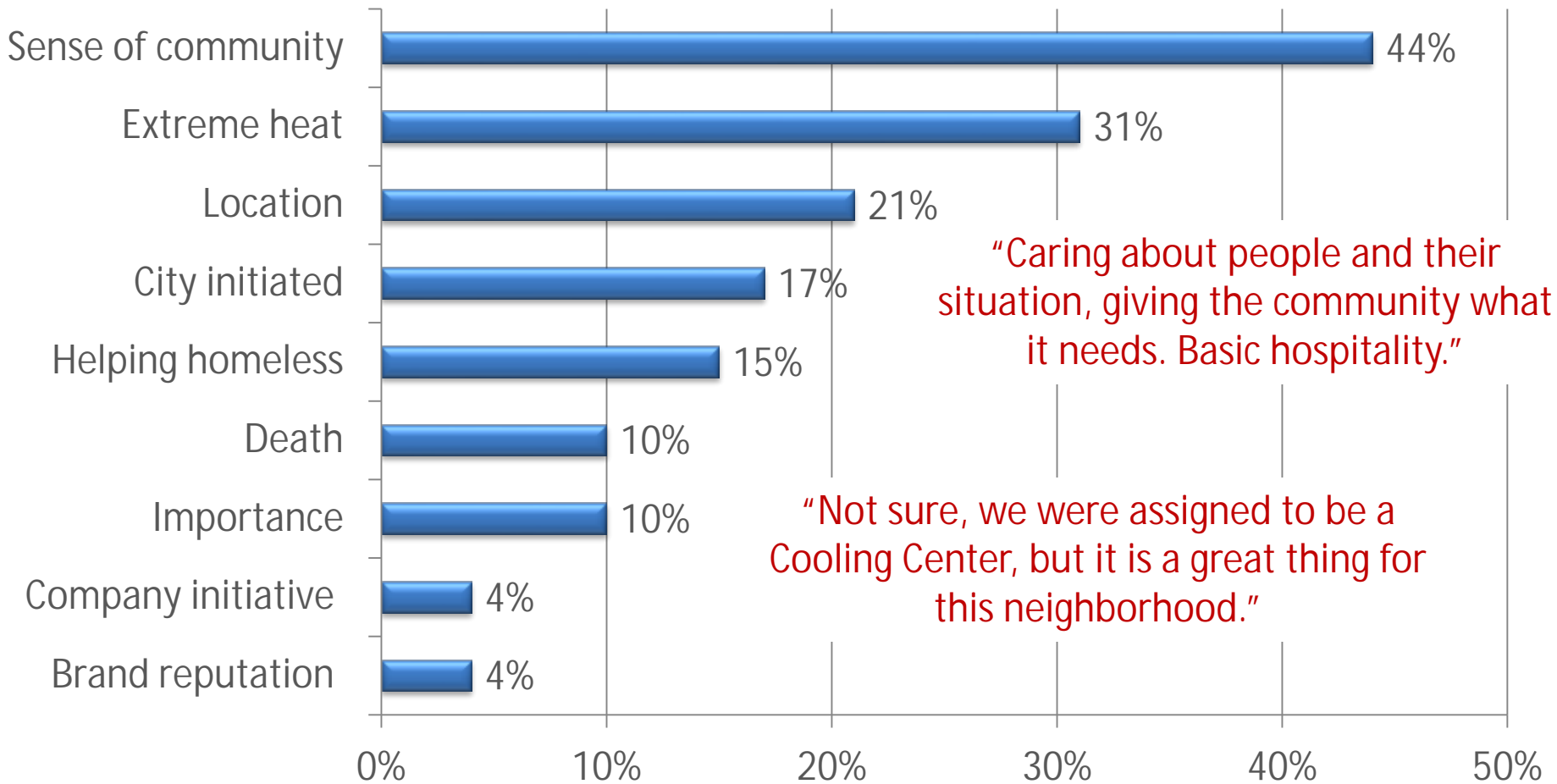
Highlights from the Facility Manager Survey

- Ø Total of 52 Facility Manager Surveys were completed.
- § 39% of Cooling Centers are open on Saturdays
- § 21% of Cooling Centers are open on Sundays
- § Only 6% of Cooling Centers are open 24/7
- § July and August tend to have the highest number of visitors

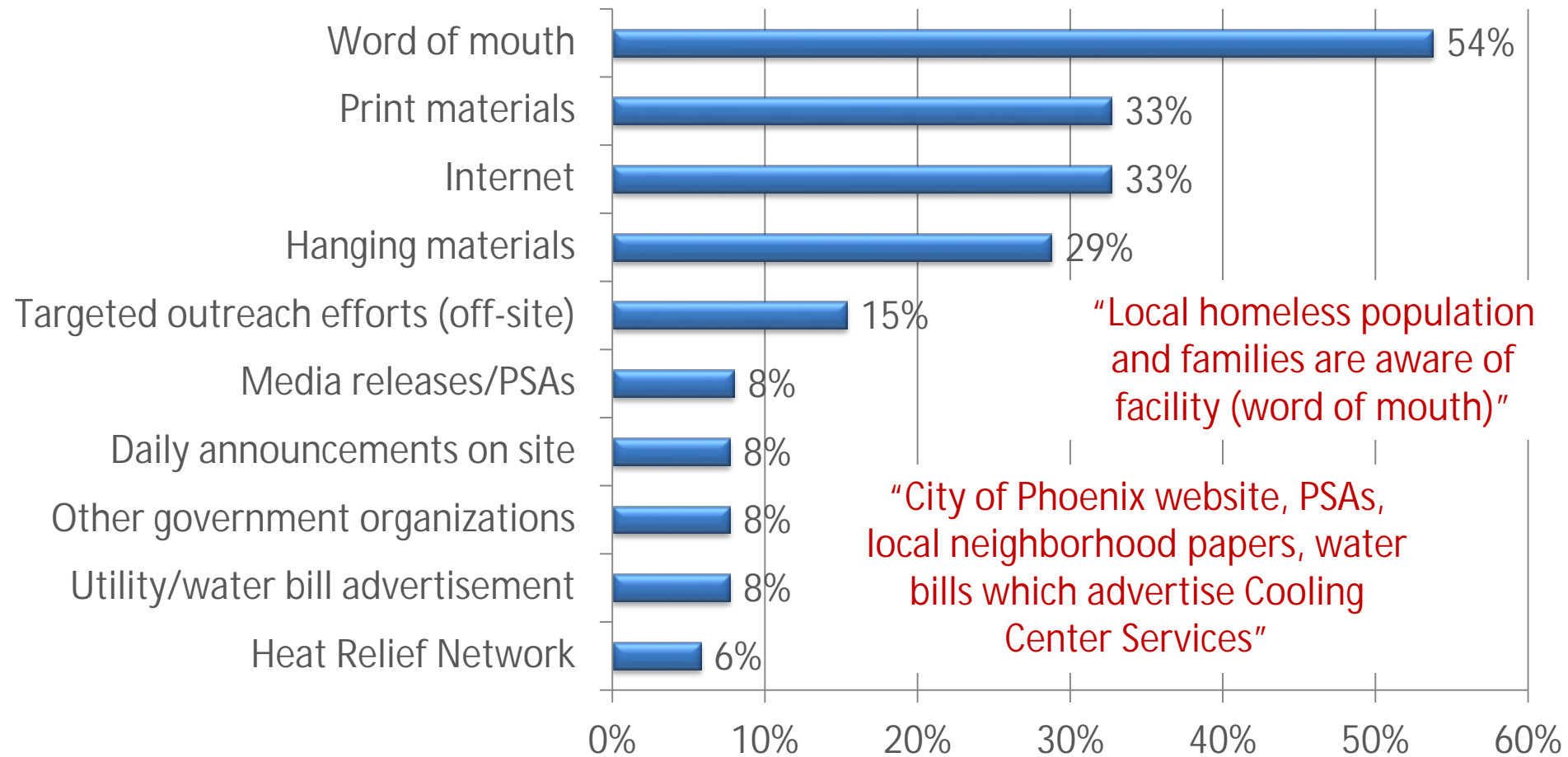
Activities	Specials	Schedule
1) Fifa Mens World Cup 2014 Go Fifa 2014	D Movies	9:00 - WELCOME
	Mon-	9:15 - Announcement
	Tues-	9:30 - Game/Activities
	Wed-	12:00 - LUNCH
	Thur-	1:00 - MOVIE
	Fri - Double feature	3:00 - SNACKS
		5:00 - close/clean up



What motivated your facility to become a Cooling Center?



How does your facility alert the public that services are available?



“Local homeless population and families are aware of facility (word of mouth)”

“City of Phoenix website, PSAs, local neighborhood papers, water bills which advertise Cooling Center Services”



Highlights from the Visitor Survey

- ∅ There were a total of 658 final visitor surveys completed
 - § Over 80% of Cooling Center visitors spoke English
 - § ½ of Cooling Center visitors indicated it was their first time at a Cooling Center
 - § Over 1/3 of Cooling Center visitors have visited a center three or more times
 - § Almost ½ of all Cooling Center visitors stay for less than one hour





Demographics of Cooling Centers Visitors



Ø Over half, **59%** of the Cooling Center visitors are identified as female



Ø Majority of visitors are unemployed
§ **Over 85%**

Ø Age Groups: Almost $\frac{3}{4}$ of the visitors were between the ages of 18-64

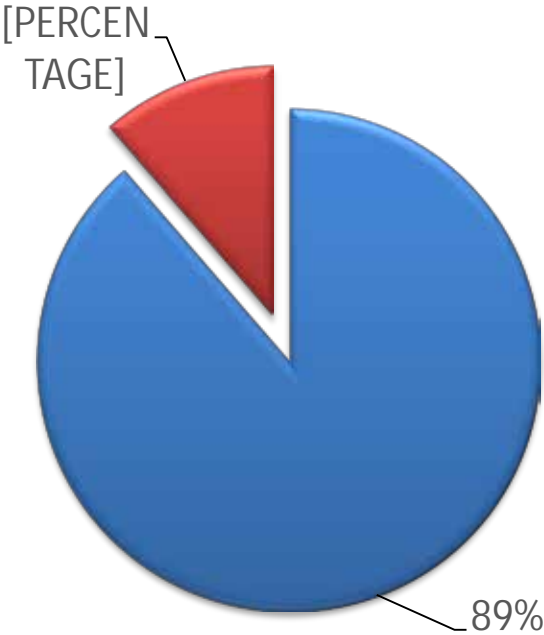
Ø **About 40%** of visitors feel their health is at risk due to high temp.

Ø Visitors by Race:

Ø Higher rates among Native Americans and African Americans

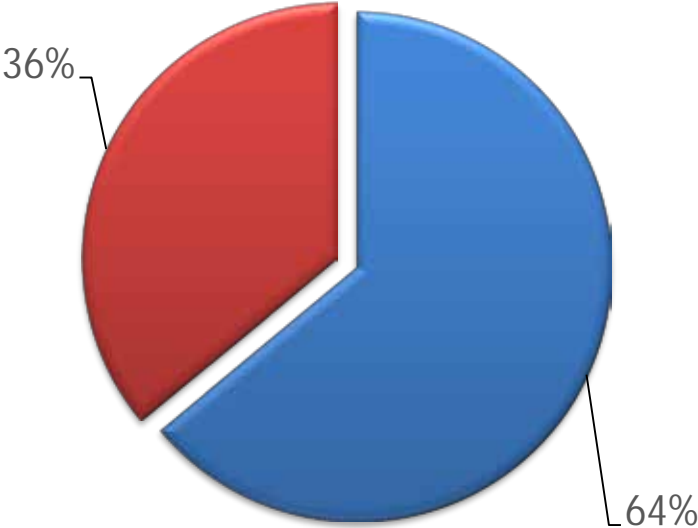
Air Conditioning Status

Air Conditioning Status of Cooling Center Visitors who had a Permanent Residence



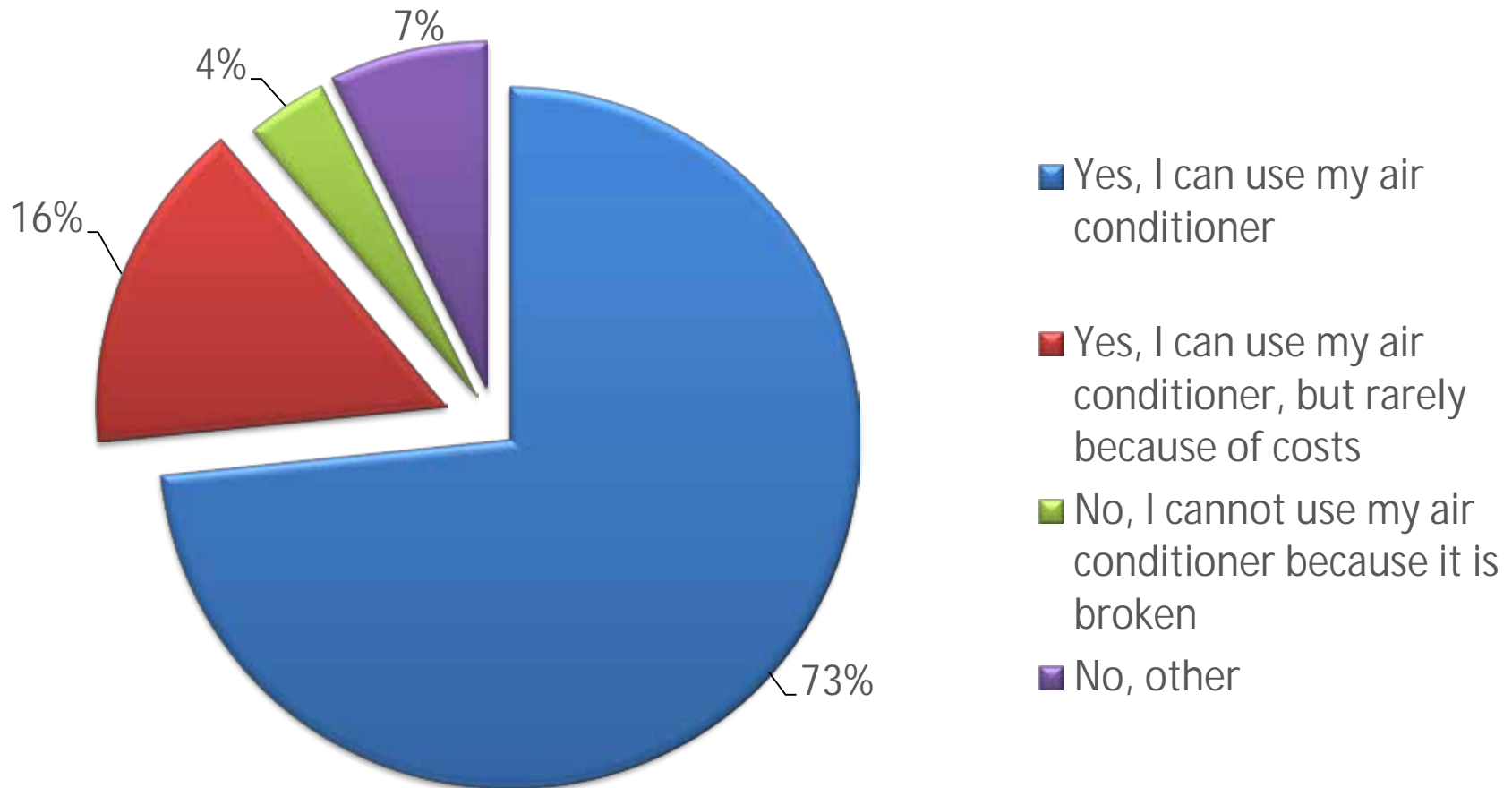
- Yes, I have air conditioning
- No, I do not have air conditioning

Air Conditioning Status of Cooling Center Visitors who did not have a Permanent Residence

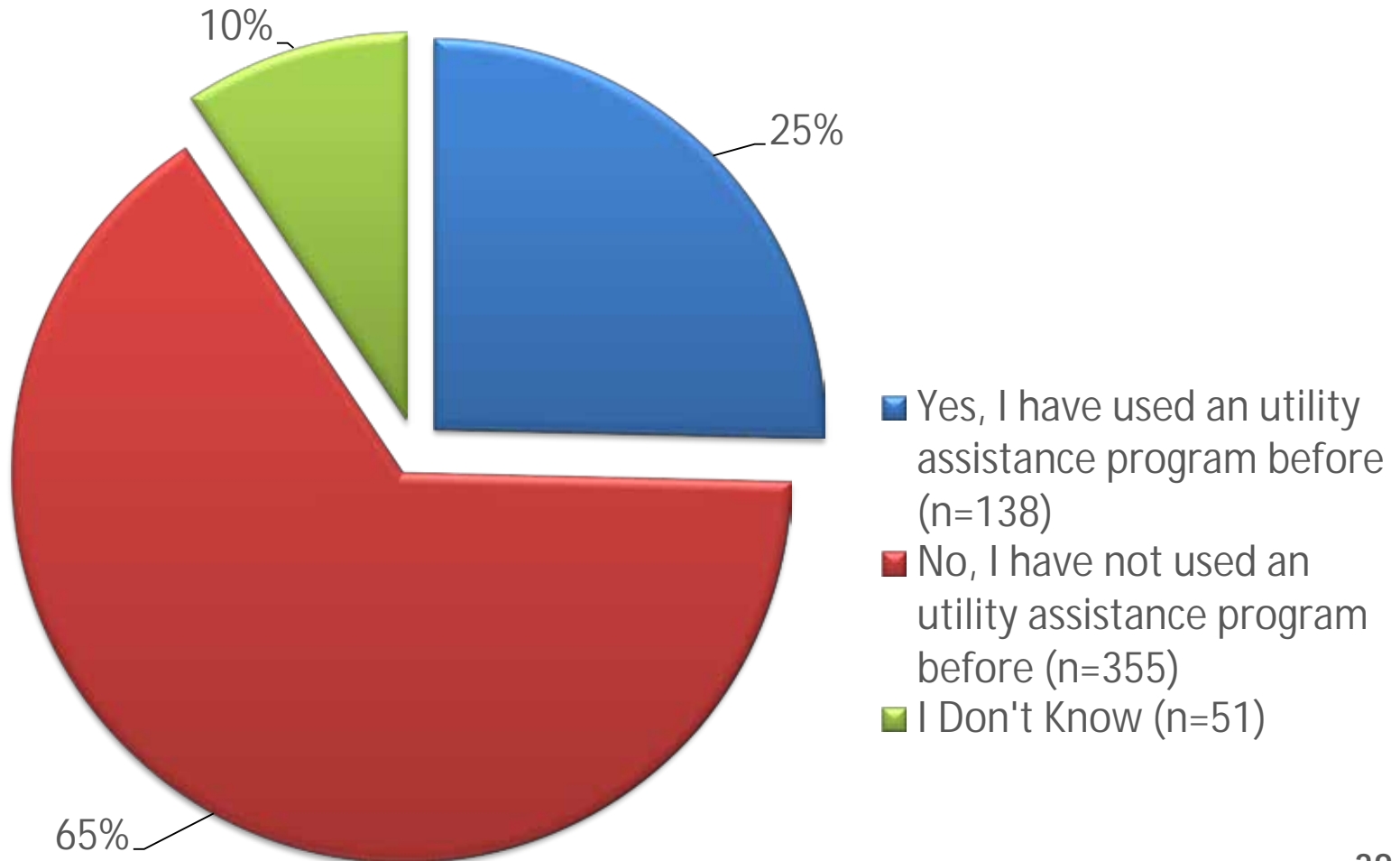


- Yes, I have air conditioning
- No, I do not have air conditioning

Visitors who are able to use their Air Conditioner



Visitors who have used an Utility Assistance Program



Knowledge of Visitors about Cooling Centers

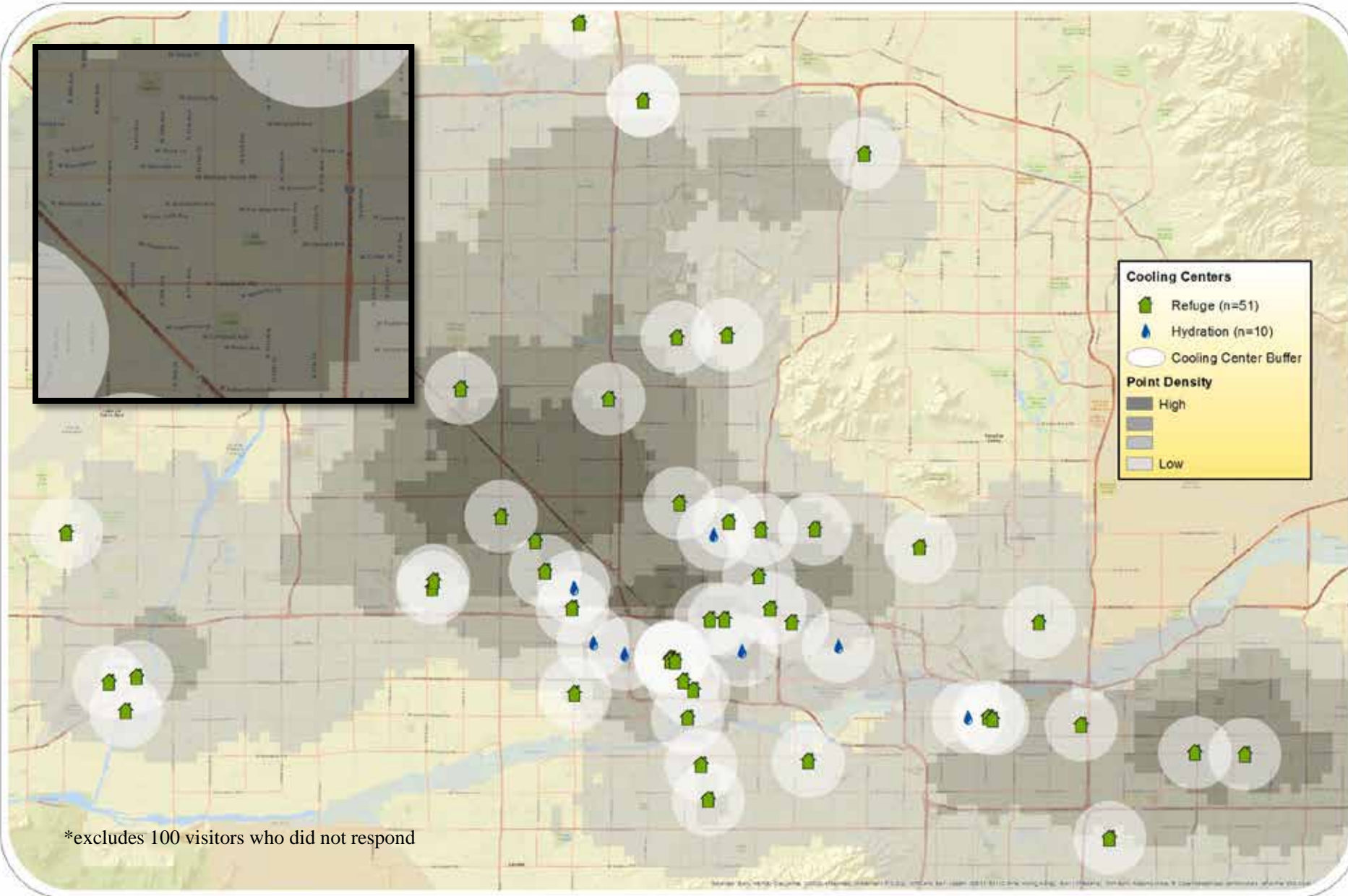


- Ø Means of travel to cooling centers
 - § 32% of visitors indicated they walk
 - § 33% of visitors use a personal vehicle
 - § 23% of visitors use public transit
- Ø Methods used by cooling center visitors to find out about Excessive Heat Warnings
 - § Television, Radio, word of mouth
- Ø Methods used by visitors to find cooling centers
 - Ø Saw its location
 - Ø Heard about cooling centers through someone they knew

Heat-Associated Illness in Maricopa County (n=6255*), 2008-2012

Point Density Map with Cooling Centers

*1502 cases excluded because residence address was unidentifiable.



*excludes 100 visitors who did not respond



Highlights from the Observational Survey

- Ø 53 Observational Surveys were completed
 - § Evaluators observed **89%** of the Cooling Centers to be easily accessible
 - § Evaluators observed that **67%** did not have an indicator or sign visible on the Cooling Center Exterior informing people that it was a Cooling Center



The Cooling Center Evaluation highlighted the following:



- Ø The need for Cooling Centers during the chronic heat months: 50% of visitors were new
- Ø The importance of understanding the demographics of the people served
- Ø The need for community and governmental partnership
- Ø The need for opening facilities in high risk areas to eliminate extensive travel: 1/3 of visitors walk to Cooling Centers
- Ø More marketing and signage for the Cooling Centers
- Ø The opportunity for Cooling Center expansion



Community Assessment for Public Health
Emergency Response (CASPER)
- Heat Vulnerability and Emergency
Preparedness Needs Assessment, Maricopa
County, 2015



Maricopa County Special Studies



Informational Gaps

- ∅ Still had informational gaps:
 - § Not community-wide
 - § Did not capture special populations
 - § Needed context for what we saw in the cooling center evaluation and mortality investigations
 - § How do we better understand these risk factors?
 - § How do we start to develop effective risk communication strategies?
- ∅ What would be the best methodology for gathering this information?
 - § Internet surveys
 - § Focus groups
 - § Additional targeted passive surveys
 - § Active survey collection

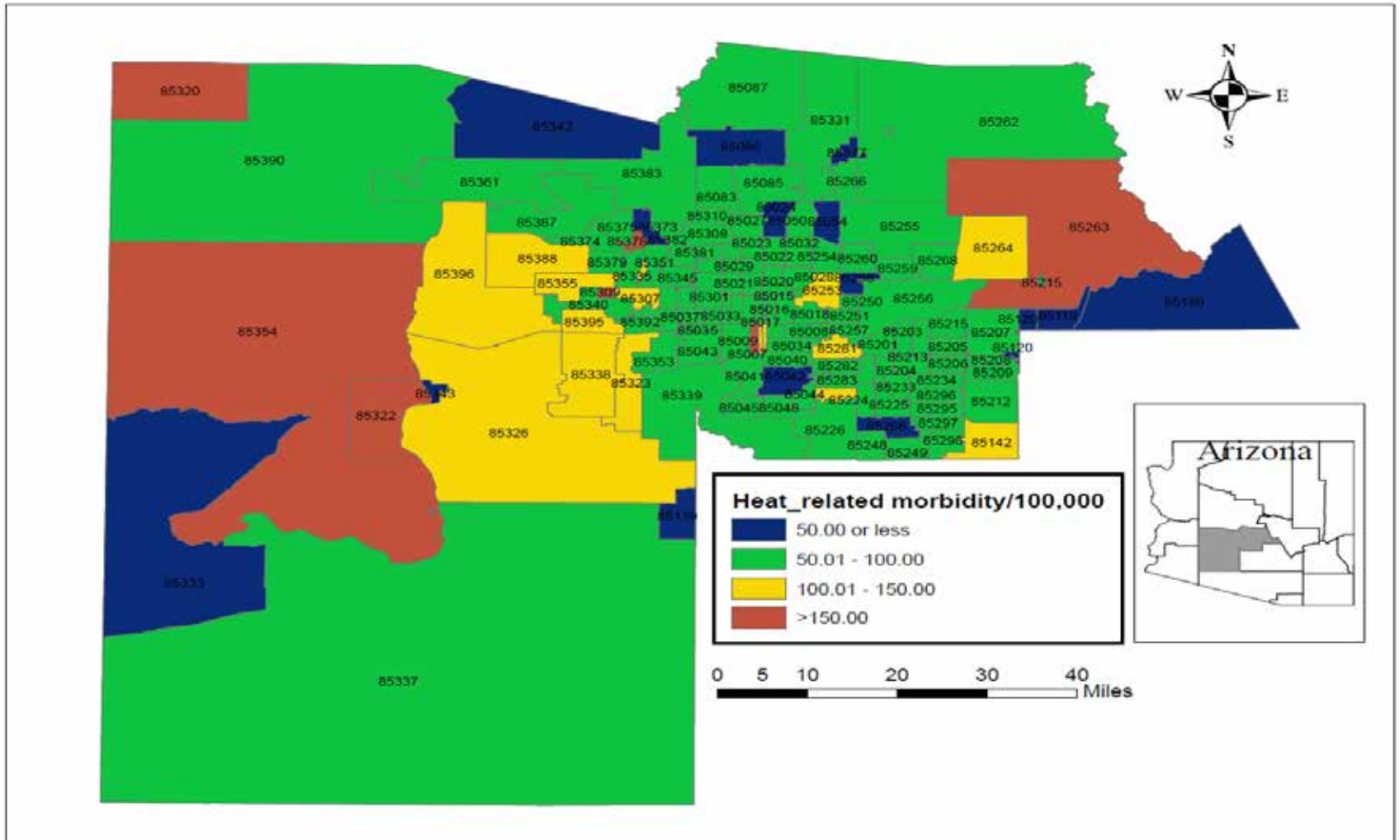
CASPER



- Ø CASPER is an epidemiologic technique designed to provide household-based information about a community in a timely and representative manner.
 - § CASPER is quick, inexpensive, flexible, and uses a simple reporting format
- Ø Received technical assistance from the CDC National Center for Environmental Health, Disaster Epidemiology Response Team
- Ø Due to differences in vulnerability MC decided on two sampling frames:
 - § High incidence
 - § Low incidence



Heat Illness Rates



q High Incidence Area: with greater or equal to 100/100,000 HR hospitalizations

q Low Incidence Area: with less than 100 HR hospitalization

Survey Content

- § Risk Perception and Preparedness Barriers
 - Major risks, Disabilities or other barriers to evacuations, Access to assistance (family or friends), and Barriers to communication
- § Knowledge of Heat Stress
 - Excessive heat warnings, Knowledge of heat illness symptoms, Heat illness episodes
- § Coping Mechanisms/Access to Resources
 - Cooling of home, Barriers to cooling of home, Knowledge of assistance programs
- § Neighborhood/Access to Resources
 - Access to community resources
 - Knowledge of Cooling Centers
- § Demographics



Response Rate

Ø Ended up knocking on 1,026 doors

Ø Surveys collected:

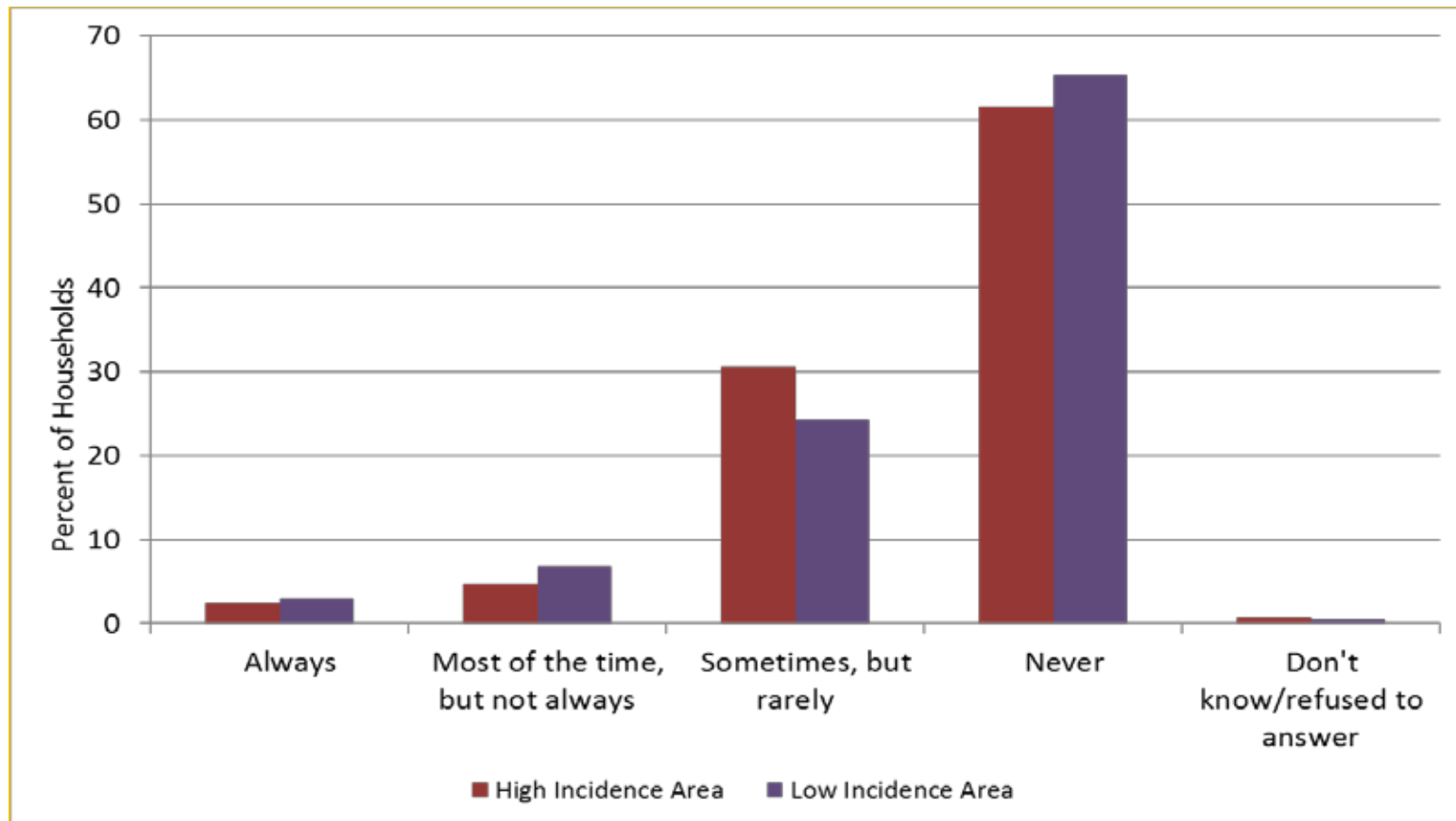
– 168 in High Incidence areas

- Contact Rate 34.6%
- Cooperation Rate 54.2%
- Completion Rate 80.0%

– 169 in Low Incidence areas

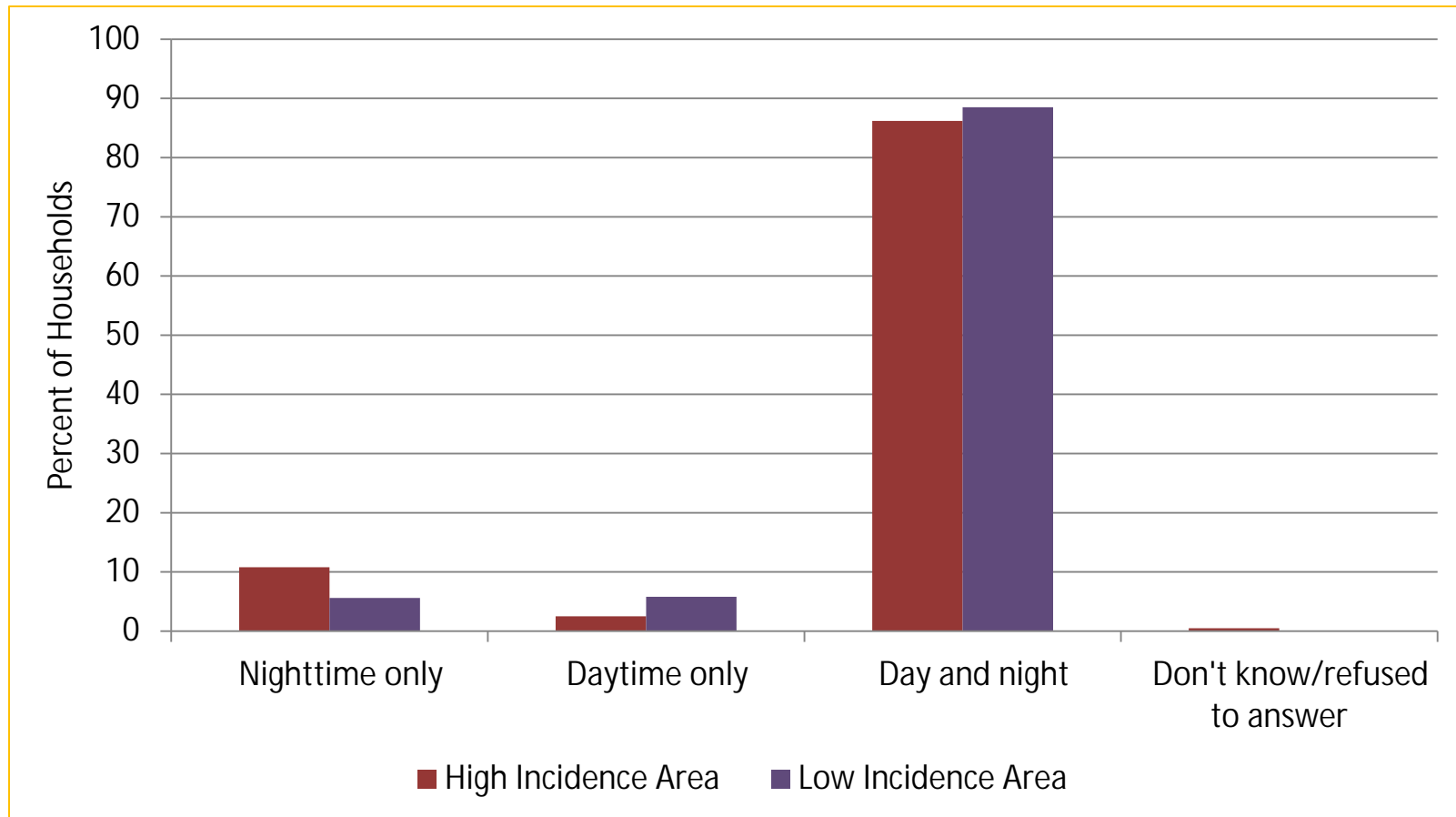
- Contact Rate 31.3%
- Cooperation Rate 48.9%
- Completion Rate 80.5%

Households that felt too hot in their homes during past summer, MC, CASPER 2015



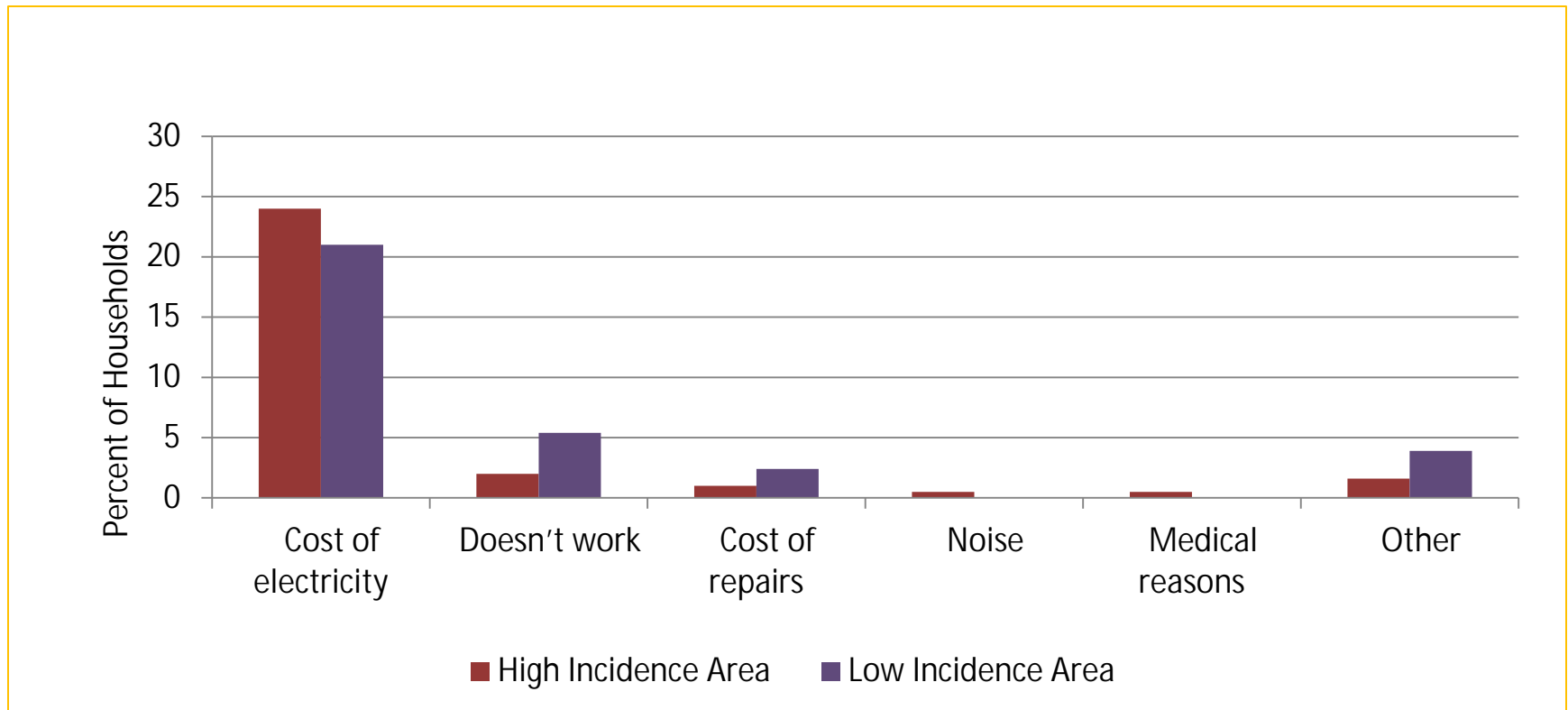
- Ø Approximately **10%** of households in both high and low incidence areas reported, "always" or "most of the time", feeling hot inside their homes.

Households with Air Conditioning by Usage, MC, CASPER 2015



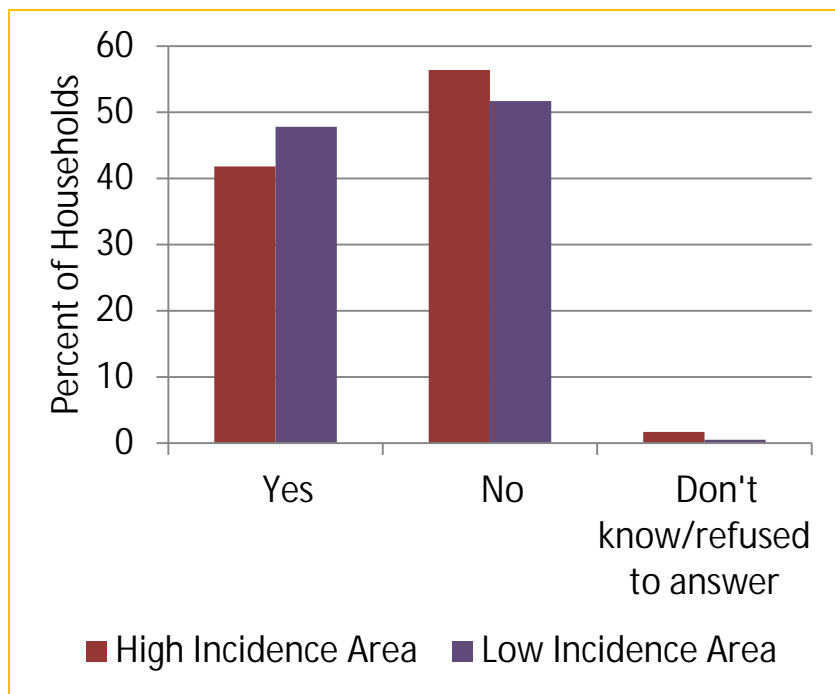
- Ø Vast majority (72%) indicated that there is nothing that prevents them from using their air conditioning day and night in both high and low incidence households.

Households with Barriers to Air Conditioning Usage, MC, CASPER 2015



Ø **One quarter** of Maricopa households in low and high incidence areas reported that cost of electricity was a barrier to using air conditioning and properly cooling their homes

Households Aware of Utility Assistance Programs, MC, CASPER



- Ø Less than half of these households are aware of utility assistance programs
- Ø Of those that were aware of utility assistance programs, only **20%** have ever applied
- Ø From those that have applied less than **30%** in both areas reported to experience barriers such as: **low funding, income too high, or it took too long**
- Ø In both high and low Incidence sample frames, the majority reported not knowing about Heat Refuge Stations

Summary



- Ø Households in both high and low incidence communities perceive extreme heat as one of top three emergencies
- Ø Knowledge gaps exist among MC residents regarding symptoms associated with heat illness and heat messaging
- Ø 10% of household reported feeling too hot always
- Ø 28% reported experiencing limitations in using air conditioning
- Ø 25% reported cost of electricity being a barrier to using air conditioning
- Ø Awareness of utility and other assistance programs is low

Assessing the Cooling Needs of
Homebound Individuals in Maricopa
County, 2016



Maricopa County Special Studies

Public Health Institute



The Climate Change and Public Health Learning Collaborative for Urban Health Departments





Objectives and Partnership

- Ø The objectives of this project were to identify the needs of homebound individuals during extreme heat events
- Ø Determine whether the county's existing services are accessible to this vulnerable population.

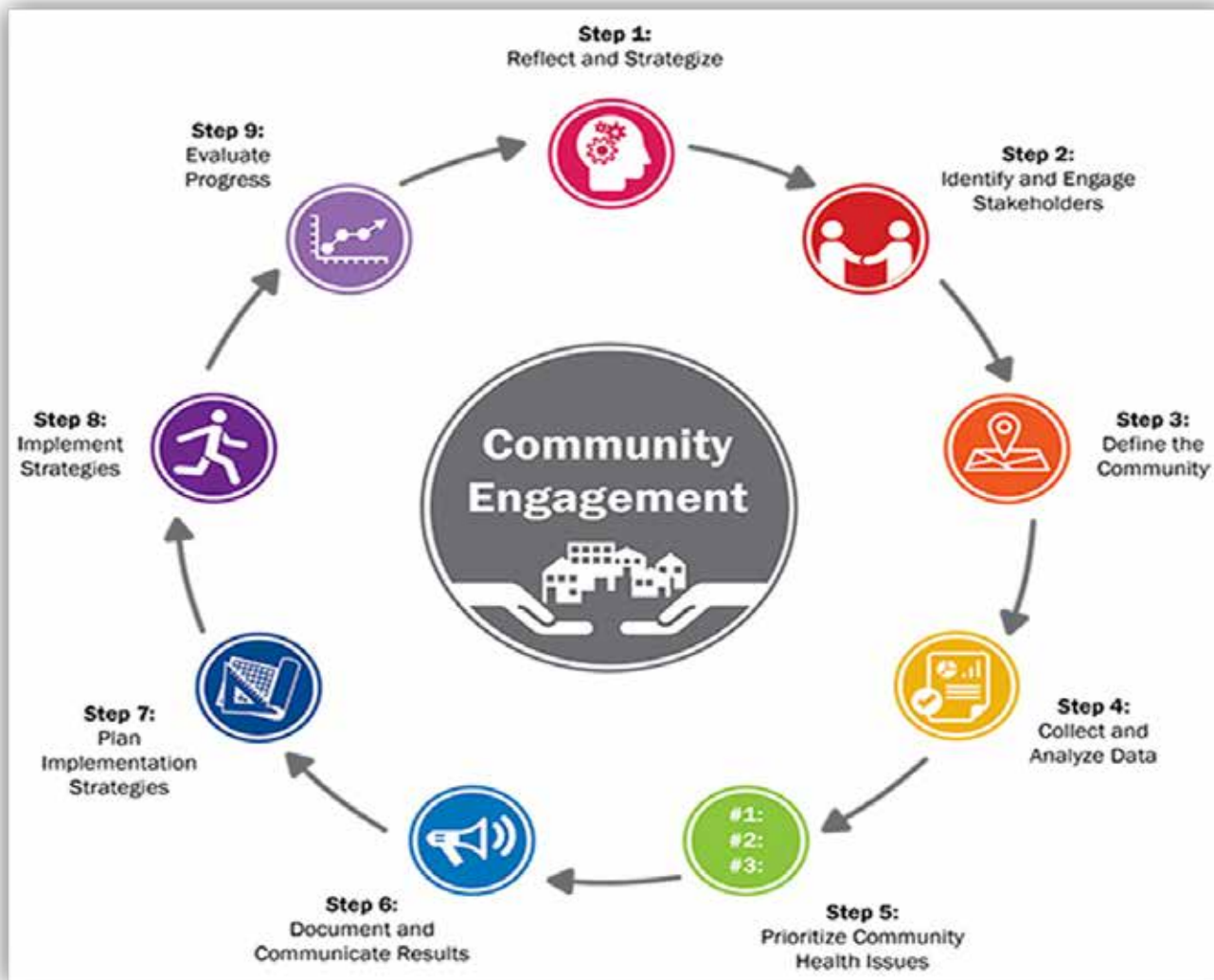




Project Rationale

- Ø MC experiences an average of 100 heat associated deaths and over 1,500 heat-associated injuries per year
- Ø Around 40% of heat-related deaths occur indoors
 - § 83% of indoor heat-related deaths occurred in homes that did not have AC running at the time of death
- Ø Homebound individuals are particularly susceptible to overheating for several reasons, including:
 - § advanced age
 - § inability to leave home if their cooling system stops working
 - § lack of knowledge of utility assistance programs
 - § difficulty applying to utility assistance programs
 - § limited incomes

Methodology: Community Health Assessment Toolkit



Survey Instrument



Ø 15 – question paper survey

Ø administered by Selrico staff during home meal delivery

Ø Focus of the survey:

§ perception of indoor temperatures

§ types of cooling systems in the home and whether they were operational and/or in use

§ reasons for not utilizing cooling systems, if applicable

§ use of utility assistance programs and barriers to use

§ Demographics (housing status, age, race/ethnicity)

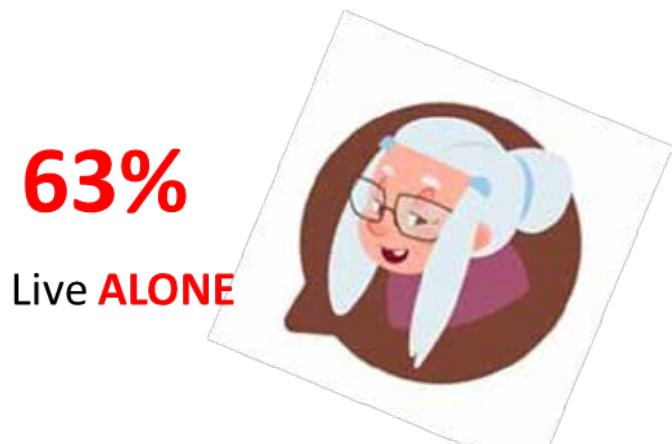
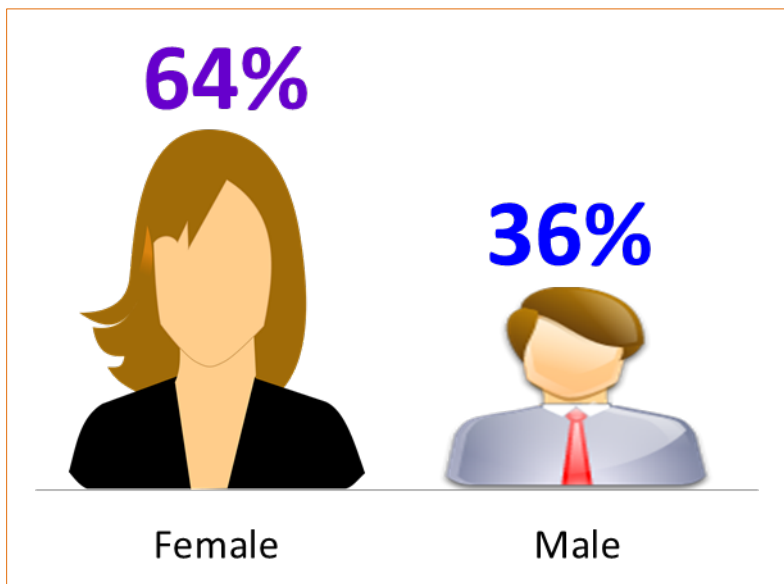


Response Rate

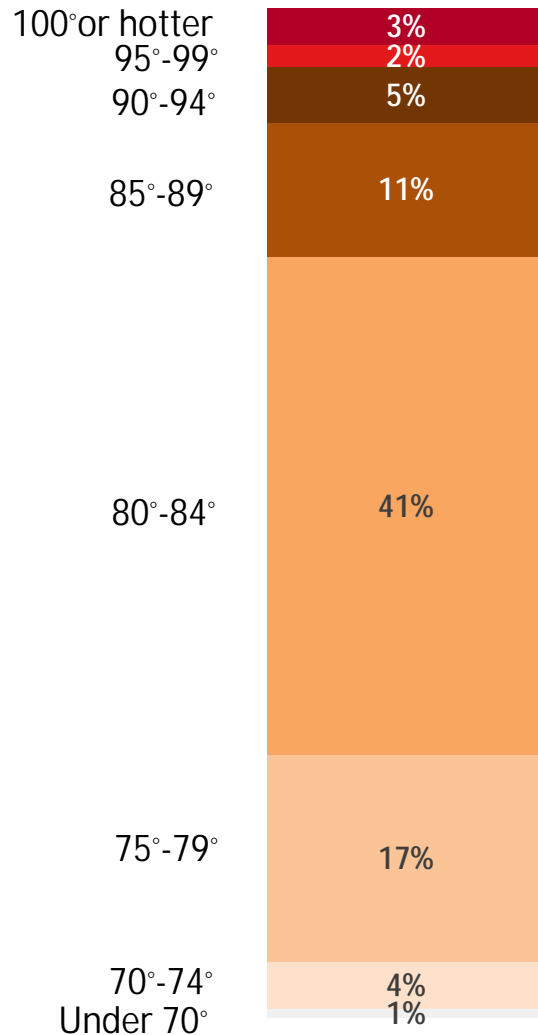
- Ø 1300 surveys were delivered to homebound individuals in Maricopa County
- Ø 472 returned completed surveys to MCDH
- Ø Response rate of 36%
- Ø English (455) and Spanish (17)



Demographic Characteristics



At what temperature do you feel too hot in your home?

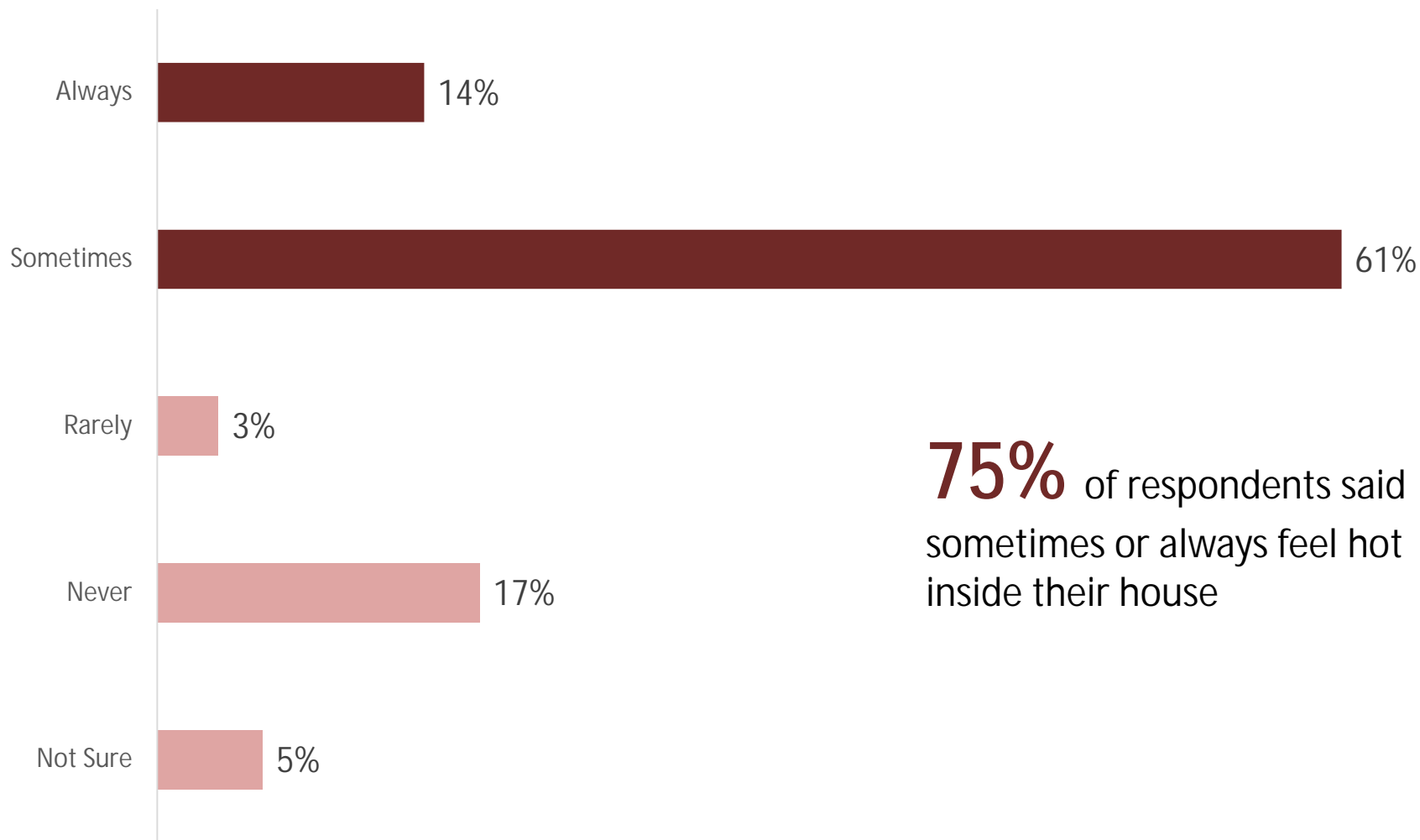


62% reported feeling too hot after the temperature reaches 80°



18% were unsure of the temperature that made them feel too hot in their home

In the summer, how frequently do you feel too hot inside your home?



Which cooling system is present and works in your home?



Which Cooling System is . . . ?

Present

[CELLRANGE] 

[CELLRANGE] 

[CELLRANGE] 

[CELLRANGE] 

[CELLRANGE] 

[CELLRANGE] 

[CELLRANGE] 

Functioning

[CELLRANGE]  [CELLRANGE]

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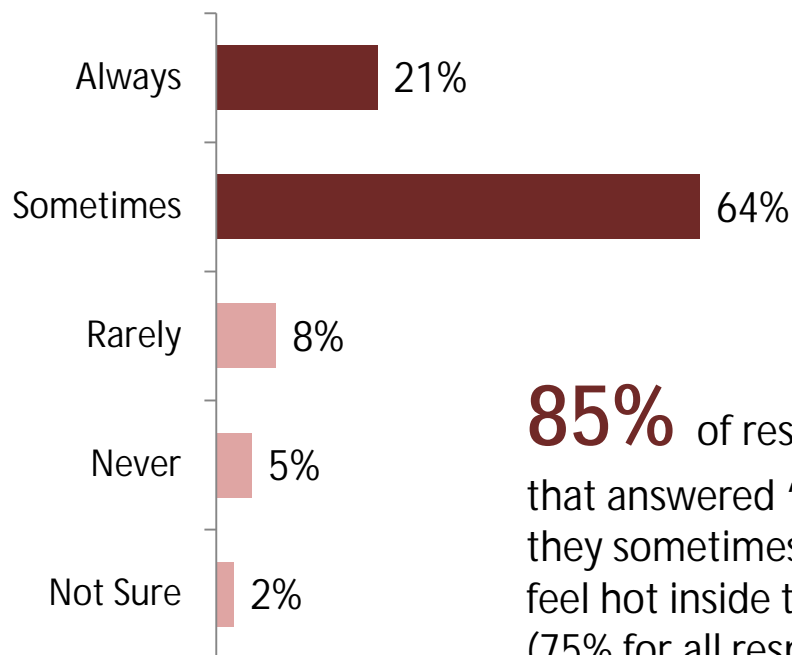
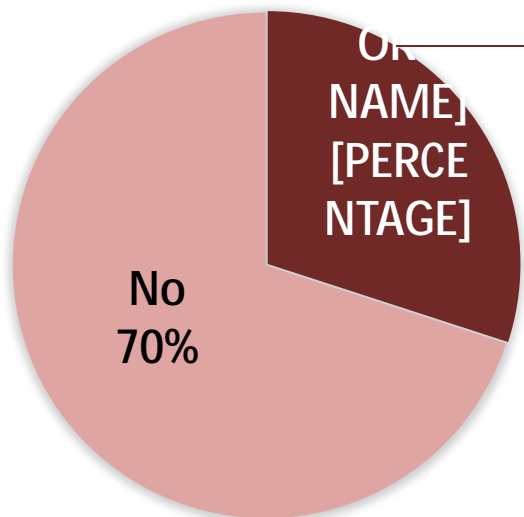
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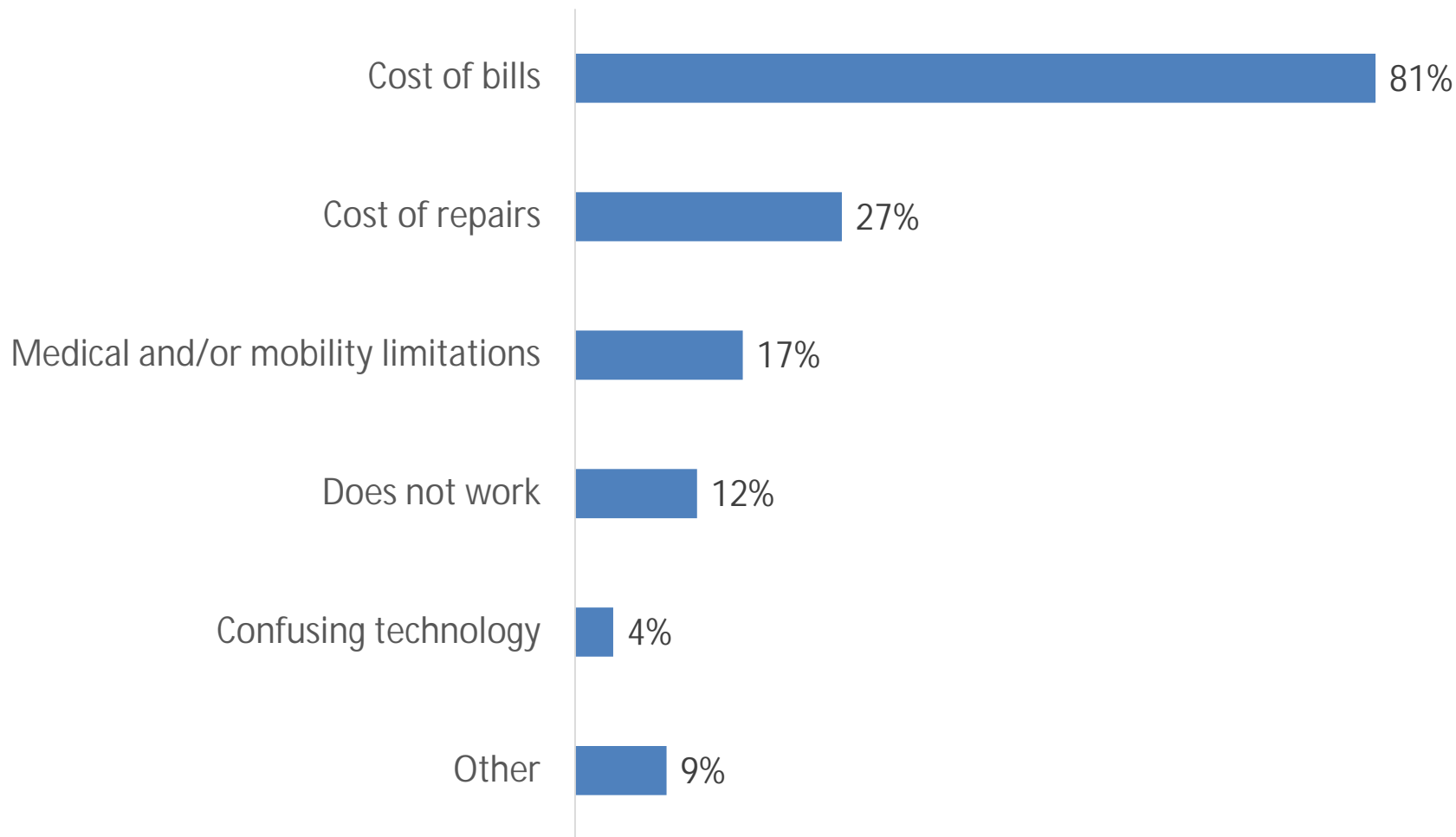
Limitations on Use of Cooling System

Does anything prevent you from using your cooling system?

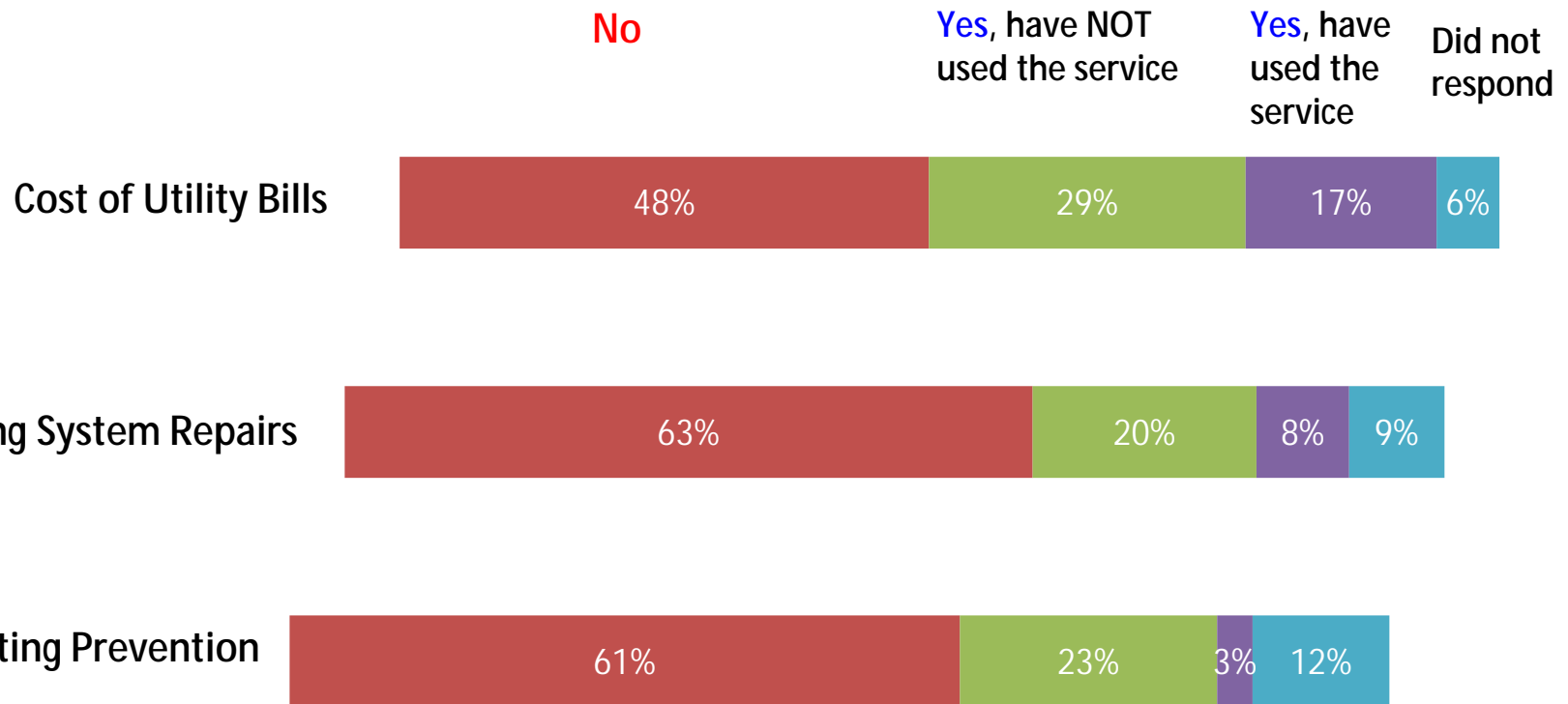


85% of respondents that answered "yes" said they sometimes or always feel hot inside their house (75% for all respondents)

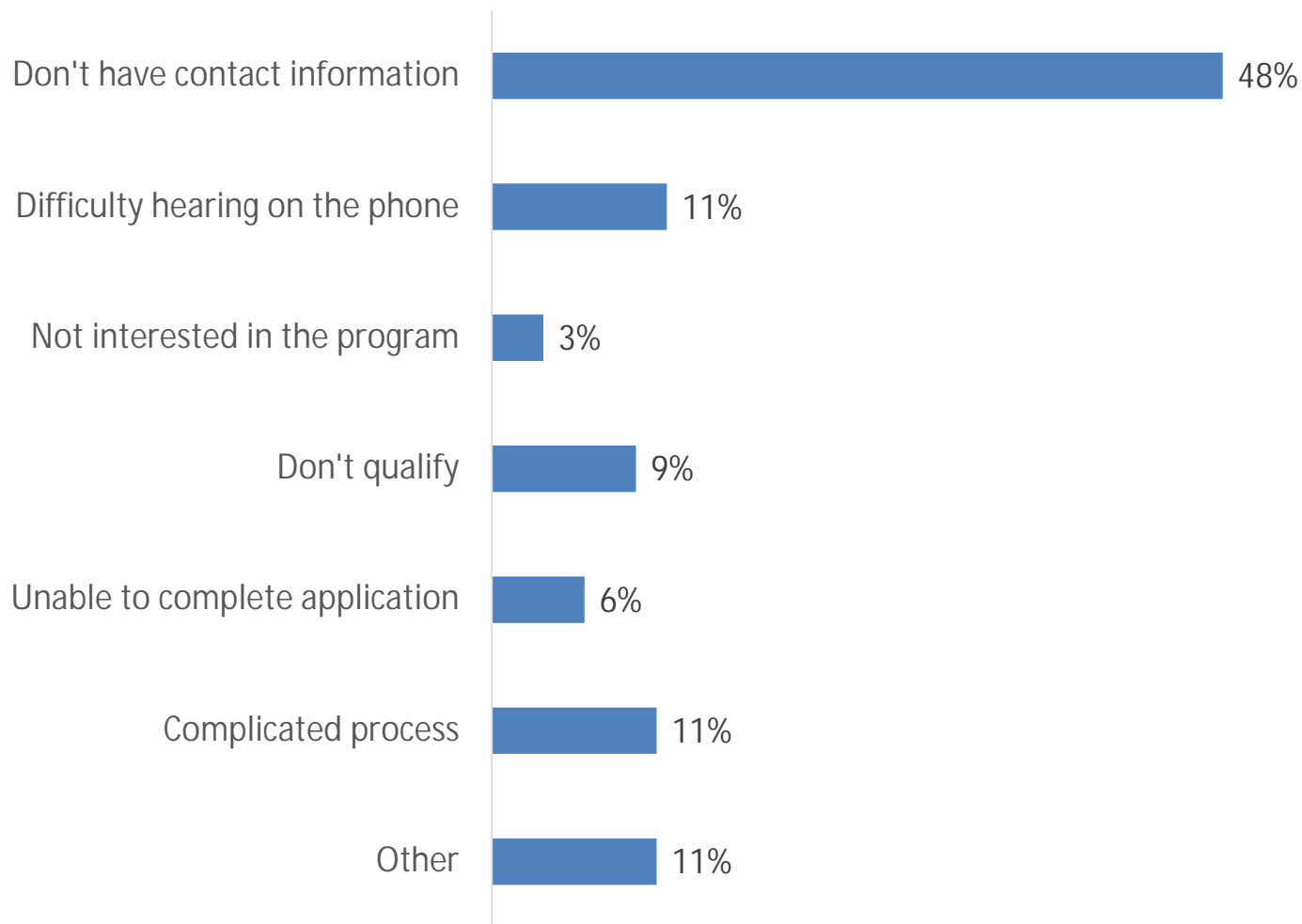
Reasons for Limitations on Use of Cooling System



Are you aware of community programs or services to help you with...



Reasons for Not Using Community Programs or Services



Summary



- Ø Home bound individuals broadly represent the same demographics as our indoor heat related deaths
 - Female
 - Over 65 years of age
 - Limited resources
 - Live alone
- Ø The majority of homebound individuals report feeling too hot at or above temperatures where adverse health effects are known to be seen
 - 21% report at 85° or above
 - 65% at 80° or above
- Ø There is a lack of awareness of current assistance programs
- Ø Awareness does not always lead to use:
 - Administrative or process barriers can be more easily addressed
 - Overall a lack of resources

Next Steps



- Ø Framework next steps focus on intervention
 - Plan (step 6)
 - Implement (step 7)
 - Monitor (step 8)
- Ø Working with Selrico to incorporate heat awareness training and screening for delivery personnel
- Ø Utility assistance resources increases
- Ø Utility assistance group led by Institute for Sustainable Communities looking and reforming assistance application and distribution process

