

April 2023

2022

**Heat-Associated Deaths
Preliminary Report**

Maricopa County
Department of Public Health
Division of Epidemiology and Informatics

Heat-Associated Deaths Over Time

Maricopa County identified a total of 425 heat-associated deaths occurring in 2022.

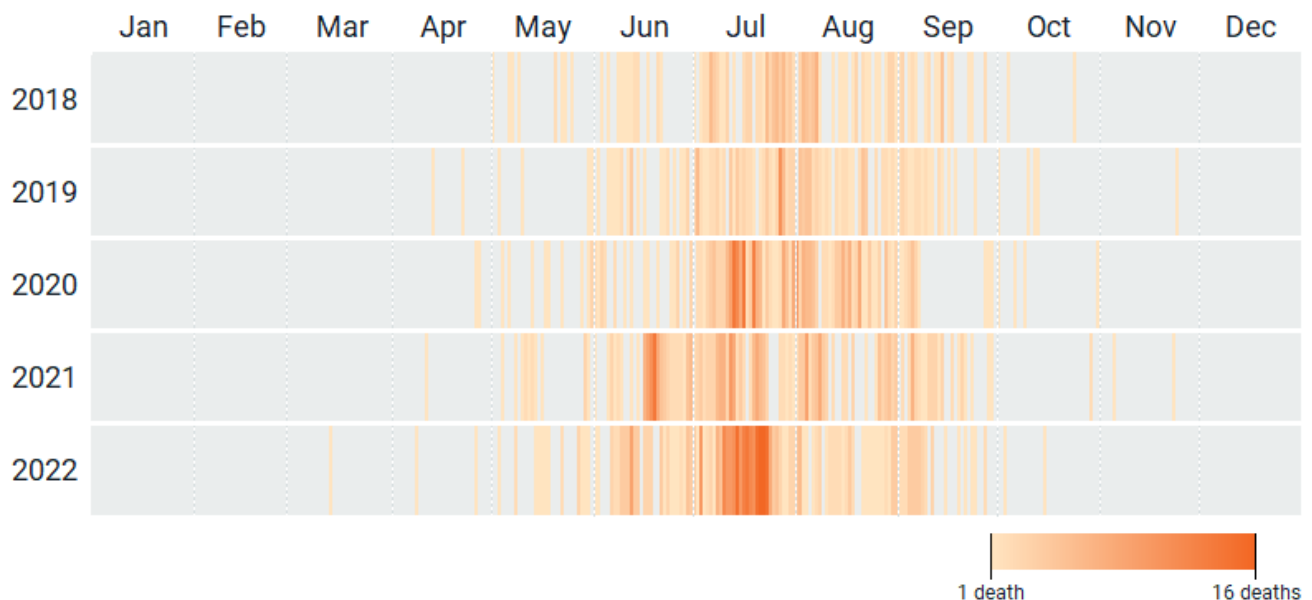
This represents a twenty-five percent increase from last year.



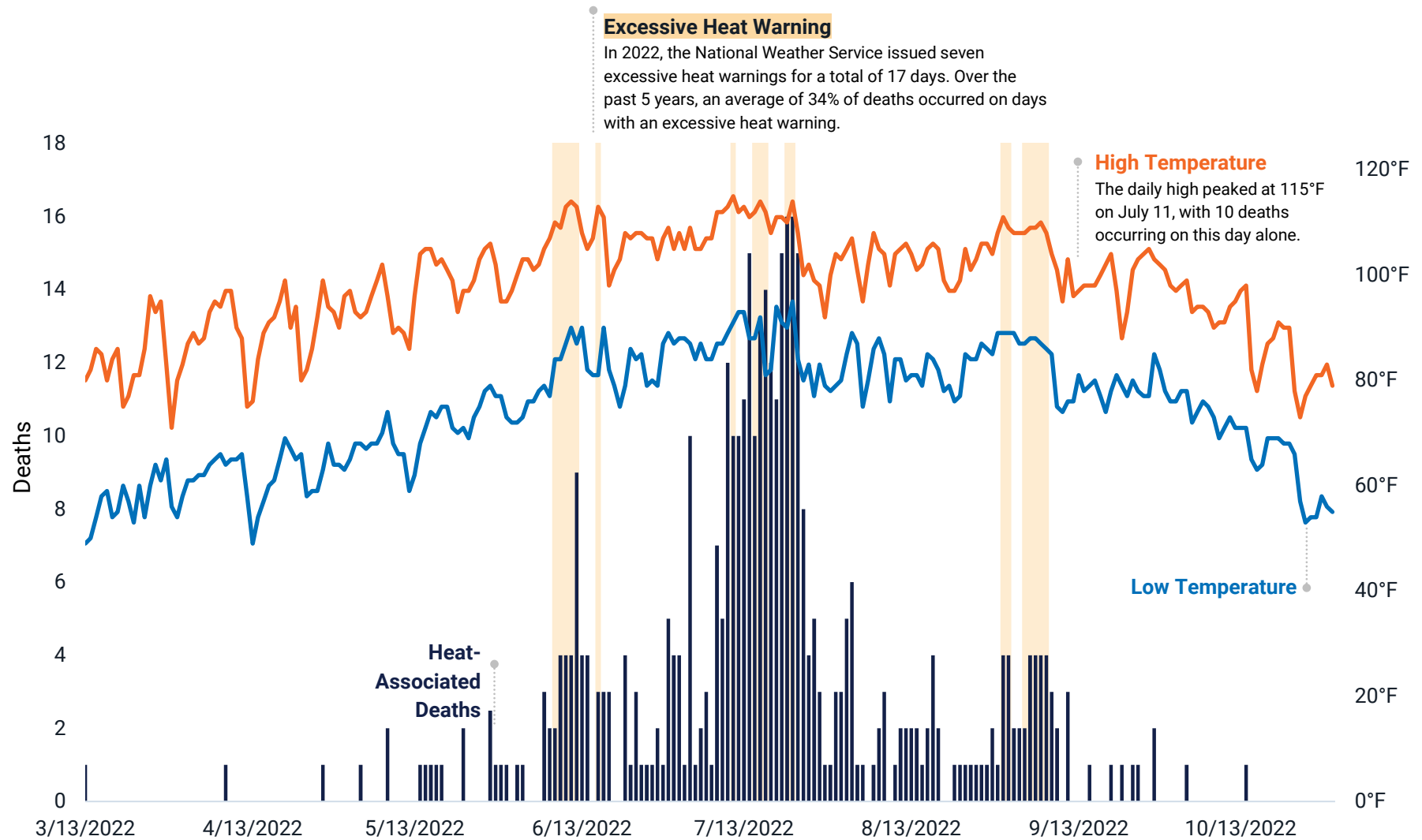
*Note: 11 cases in 2020 and 12 cases in 2021 either recently tested positive for COVID prior to death or tested positive for COVID at the time of death.

In 2022, more than half of all heat-associated deaths occurred during the month of July.

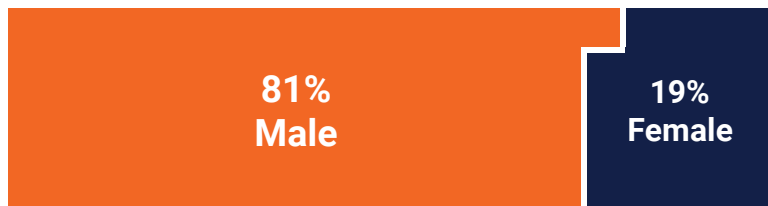
Compared with previous years, a higher proportion of deaths occurred in July (58%) and fewer deaths occurred in August (11%).



In 2022, 31% of heat-associated deaths occurred on days with an excessive heat warning.

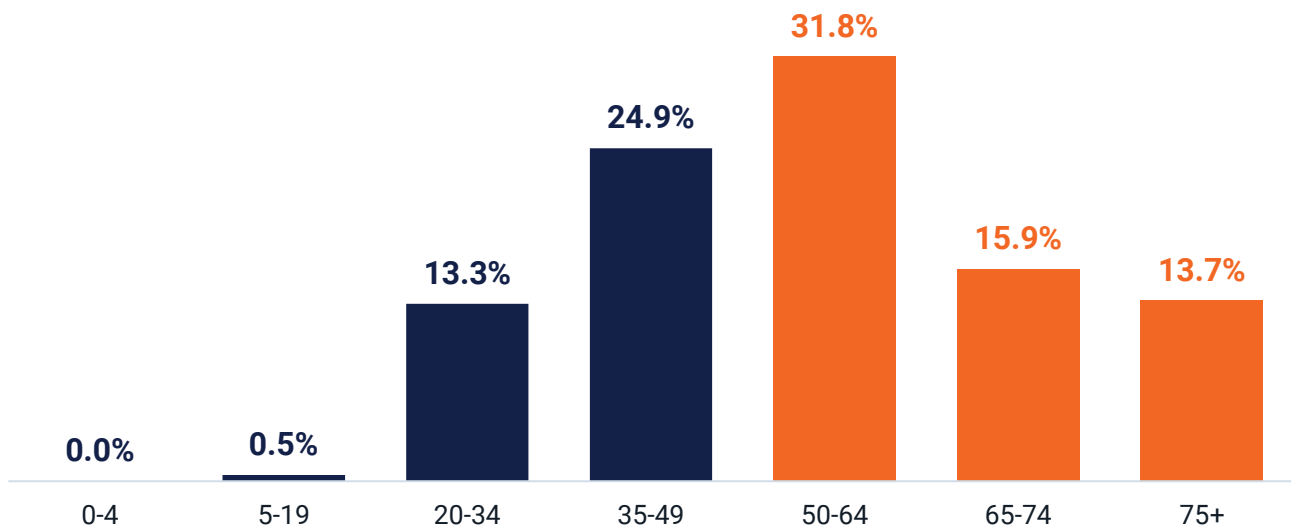


Demographics Overview

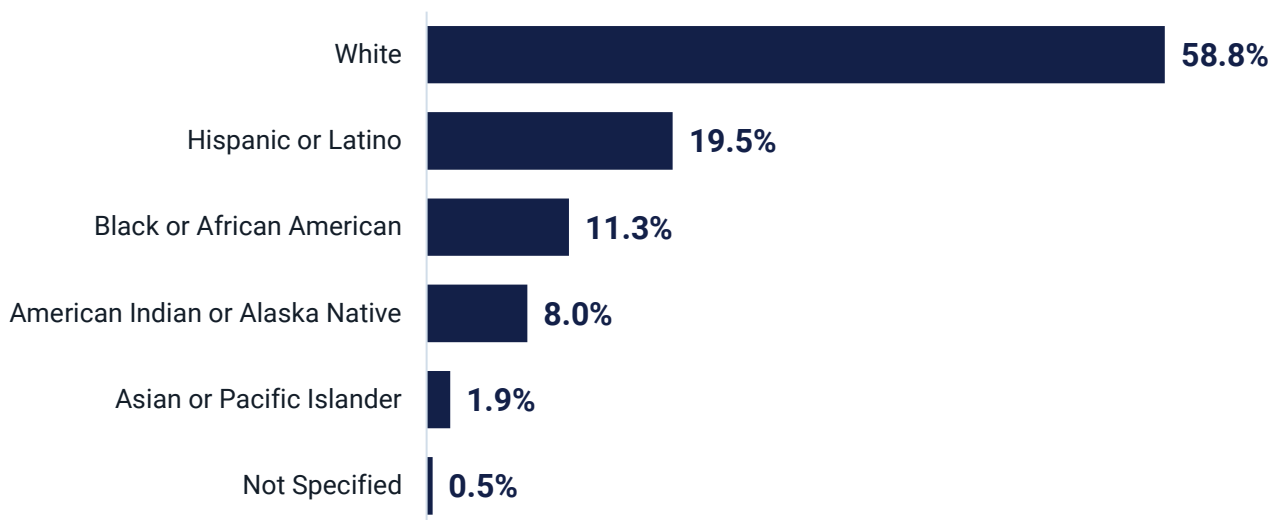


Males accounted for more than 80% of heat-associated deaths in 2022.

Nearly two-thirds of all heat-associated deaths occurred among individuals aged **50 years or older**.

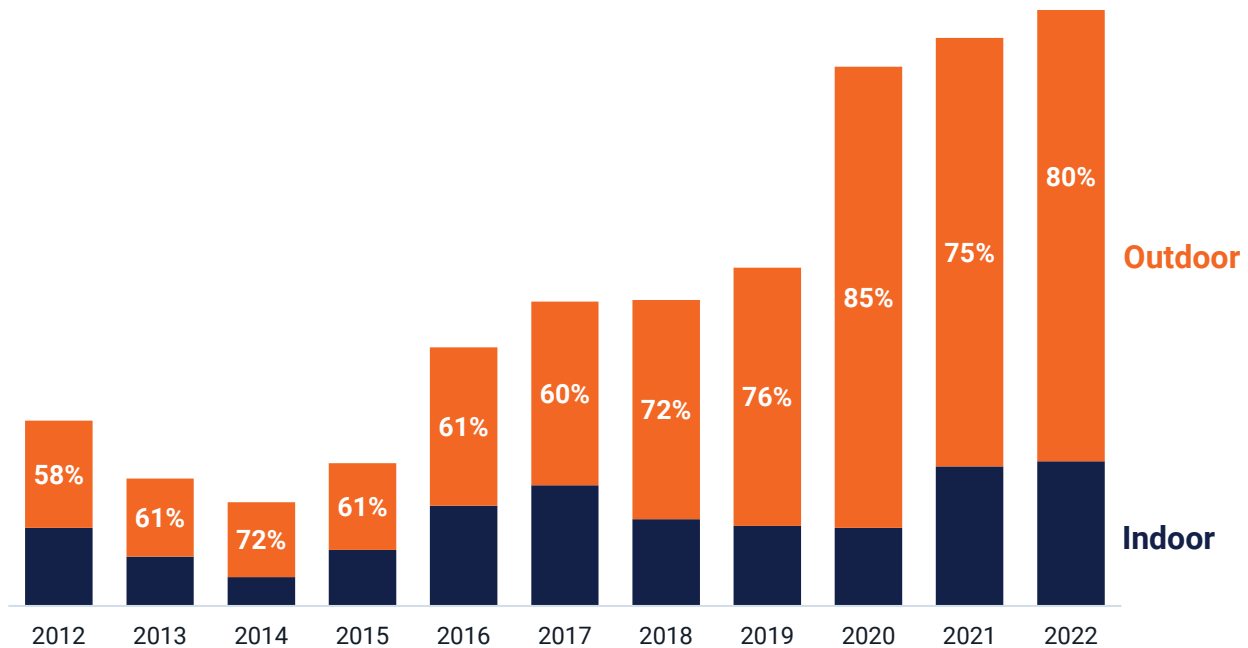


Nearly 60% of heat-associated deaths occurred among non-Hispanic White individuals. Compared to the proportion in which they make up Maricopa County's population, African Americans (7.4%) and American Indians (3.6%) are overrepresented in heat deaths.

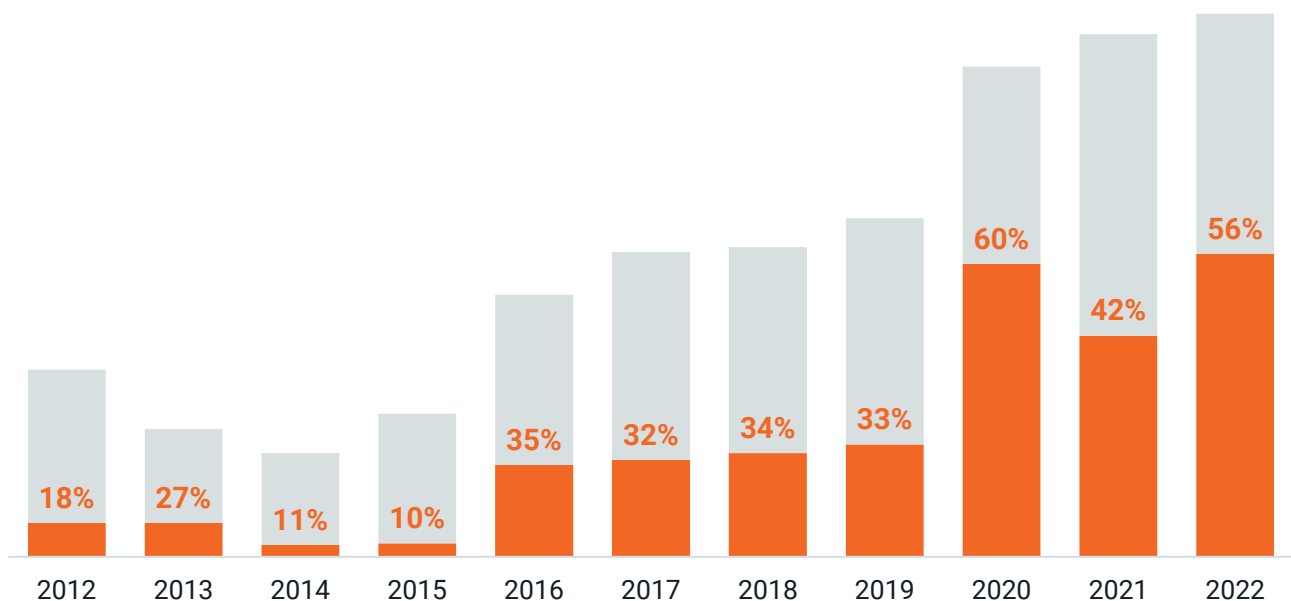


Circumstances of Death

Deaths in outdoor settings have driven the increase in total number of heat-associated deaths in recent years.

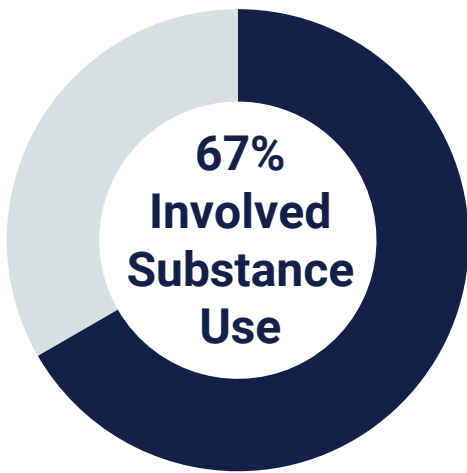


In recent years, people experiencing homelessness have accounted for an increasingly large share of all heat-associated deaths. According to the Maricopa Association of Governments Point-in-Time Count, there was a 36% increase in homeless individuals overall in Maricopa County from 2019-2022.



Note: Percentages of heat-associated deaths with known living situation.

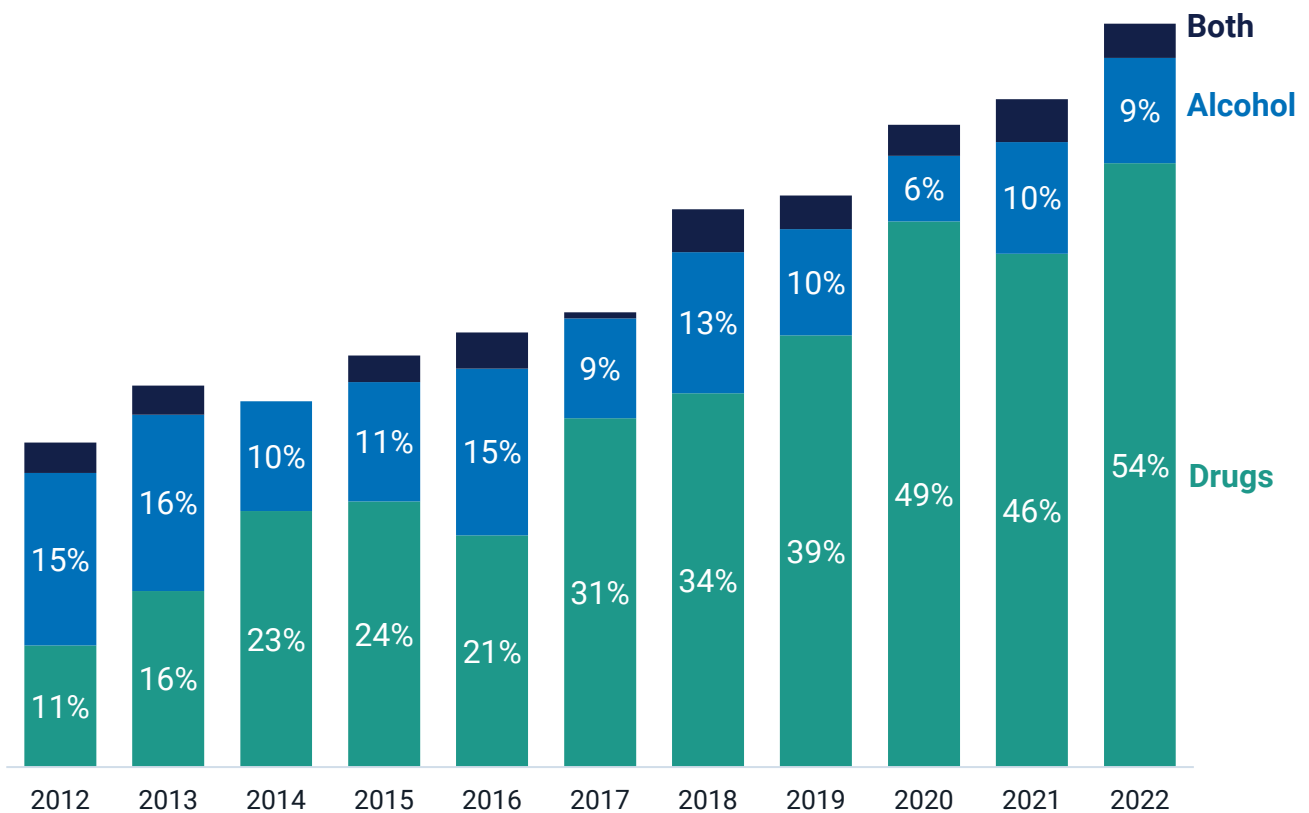
*[Maricopa Association of Governments Point-in-Time Count Source](#)



Maricopa County identified 283 deaths involving substance use, representing over two-thirds of all heat-associated deaths recorded in 2022.

Substance use includes use of drugs and/or alcohol. Stimulant drugs, especially methamphetamines, were the most common substances involved in heat-related overdose deaths in Maricopa County in 2022.

Over half of all heat-associated deaths involved drug use. The proportion of heat deaths involving drug use has increased in recent years.



Methodology

Surveillance data is obtained from the following sources:

1. The Maricopa County Office of the Medical Examiner (OME) forwards suspected heat-related deaths to MCDPH and provides data including demographics, preliminary information regarding how the death occurred, and the circumstances of death. In the past, this information came solely as a weekly line list with limited information for each case. However, in February of 2012, MCDPH started receiving all preliminary reports of death (PRODs) from the OME. These reports provide expanded information daily and have changed the screening methods used by MCDPH staff to ensure that all potential heat-related deaths are documented.
2. The MCDPH Office of Vital Registration registers all Maricopa County death certificates in the Arizona Department of Health Services vital records database. The MCDPH Office of Epidemiology searches this database looking for causes of death associated with environmental heat. A Statistical Analysis Software (SAS) program looks for the key phrases and International Classification of Disease-10 (ICD-10) codes listed below.

Key Phrases
HEAT EXPOSURE
ENVIRON
EXHAUSTION
SUN
HEAT STRESS
HEAT STROKE
HYPERTHERMIA

ICD 10 Code	Corresponding Definition
X30	Exposure to excessive natural heat
T67.X	Effects of heat and light
P810	Environmental hyperthermia of newborn

3. Hospital and media reports can sometimes initiate a heat death investigation, for example, if a child is reportedly left in a hot car.

Once data are received, analysis of the information is required to identify only those deaths caused because of environmental heat. Environmental heat is heat generated by the climate (sun, humidity, etc.) rather than heat from man-made sources such as ovens or manufacturing equipment. Heat-associated deaths are categorized based on the classification criteria listed below:

Heat-caused (HC) deaths are those in which environmental heat was directly involved in the sequence of conditions causing deaths. These are deaths where environmental heat terms were indicated in **Part I**¹ of the death certificate causes of death (diseases or conditions in the direct sequence causing death), for cause of death variables (cod_a, cod_b, cod_c, or cod_d). County of death: Maricopa.

Heat-related (HR) deaths are those in which environmental heat contributed to the deaths but was not in the sequence of conditions causing these deaths. These are cases where environmental heat terms were mentioned in **Part II**² of the death certificate causes of death (diseases and conditions contributing but not directly resulting in the death sequence), but not in any of the Part I death variables (cod_a, cod_b, cod_c, or cod_d). County of death: Maricopa.

For the purposes of this report, heat-caused and heat-related deaths are combined and referred to as “heat-associated deaths.” Please note that most jurisdictions report only heat-caused deaths. This should be considered when comparing Maricopa County data with data from other locations.

Death certificate data, in combination with the OME notes, are used to produce the information that is contained in this report. Total case count, demographics, residency, drug/alcohol use, and years lived in Arizona are directly retrieved from death certificate data. Place of death location, indoor/outdoor occurrence, air conditioning use, and homelessness are retrieved based on explicit notations made in the death certificate and/or OME notes. For the purposes of this report, reasons for not having a cooled environment at the time of death in indoor cases where an A/C unit was present were grouped into three categories: non-functioning, functioning but turned off, and no electricity. “Non-functioning” is defined as an A/C unit that was not operating properly, was broken, or could not be turned on despite the presence of electricity. Cases categorized as having a “functioning but turned off” A/C unit indicates that the unit worked properly but the A/C was turned off for some reason at the time of the OME scene inspection. In cases where the unit could not be turned on due to a lack of electricity, regardless of whether it was functioning or non-functioning, were counted in the “no electricity” category.

Homelessness is defined as having an address on the death certificate that matches a homeless shelter, government agency, business, or intersection. Cases are also classified as homeless if there is an indication on the death certificate. If the address is listed as unknown on the death certificate, then an examination of the medical examiner’s notes is made to

determine if there is a reference to an address - if none, then the person is classified as homeless. If the address is listed as out of jurisdiction, then time spent in Arizona, as provided by the death certificate, is taken into consideration.

Once classification is completed, the data are summarized for the production and dissemination of reports. Reports are generated weekly during the season and posted to the MCDPH website which can be found at: <https://www.maricopa.gov/1858/Heat-Surveillance>

¹ **Part I of the death certificate:** cod a – is the immediate cause (final disease or condition resulting in death) cod b, cod c, cod d – are sequentially listed conditions leading to the cause listed on cod a.

² **Part II of the death certificate:** Other significant conditions contributing to death but not resulting in the underlying cause given in Part I.



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