



O R E G O N  
Health & Human Services

# Marion County Heat Related Illness Surveillance Report 2019-2023

Release Date: 3/13/2024

## Purpose of this report

Environmental factors affect population health, risking an individual’s ability to live a healthy and purposeful life. This report evaluates heat related illness emergency department and urgent care visits, hospitalizations, deaths, and high heat index days among Marion County residents using data from the Oregon Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE), Oregon Health Authority Center for Disease Statistics, and the National Oceanic and Atmospheric Administration.

**\*\*All counts and rates are based on patient’s residence and not the location of where they are seen for care.\*\***

## Contents

Purpose of this report.....	2
High Heat Index Days – Above 80° F   90° F   103° .....	3
Emergency Department & Urgent Care Visits .....	5
Hospitalizations.....	7
Deaths .....	7
Demographics .....	9
Sex .....	9
Age.....	10
Race .....	11
Ethnicity.....	12
Geographic Designation – Rural & Urban Communities.....	13
Zip Code.....	14
Identified Homeless & Unsheltered Persons .....	16
Summary .....	17
References.....	18

Prepared by:

Michael Keuler, MCHHS Environmental Health Resiliency Coordinator  
Aryn Walker, MCHHS Senior Epidemiologist

## High Heat Index Days – Above 80°F | 90°F | 103°F

Figure 1: Heat Index Classifications, NWS<sup>5</sup>

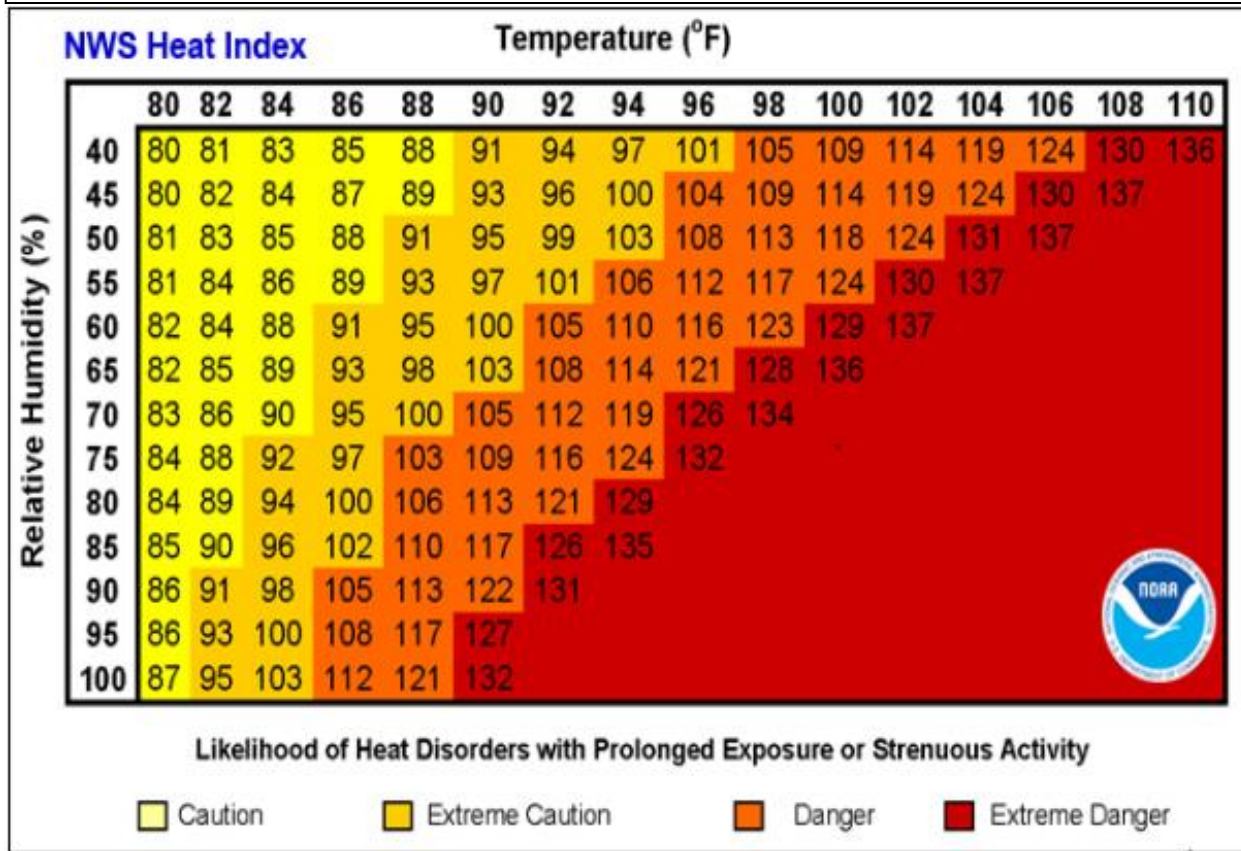
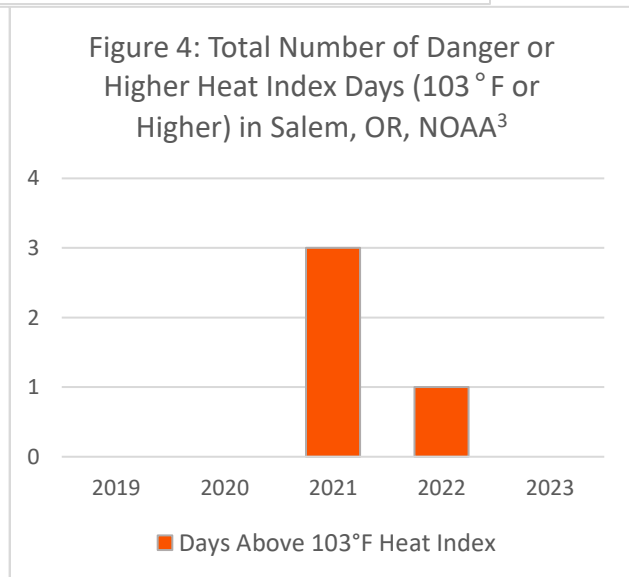
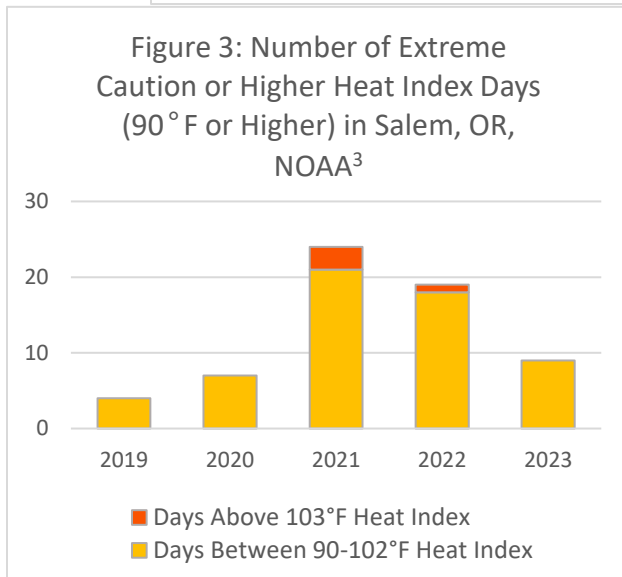
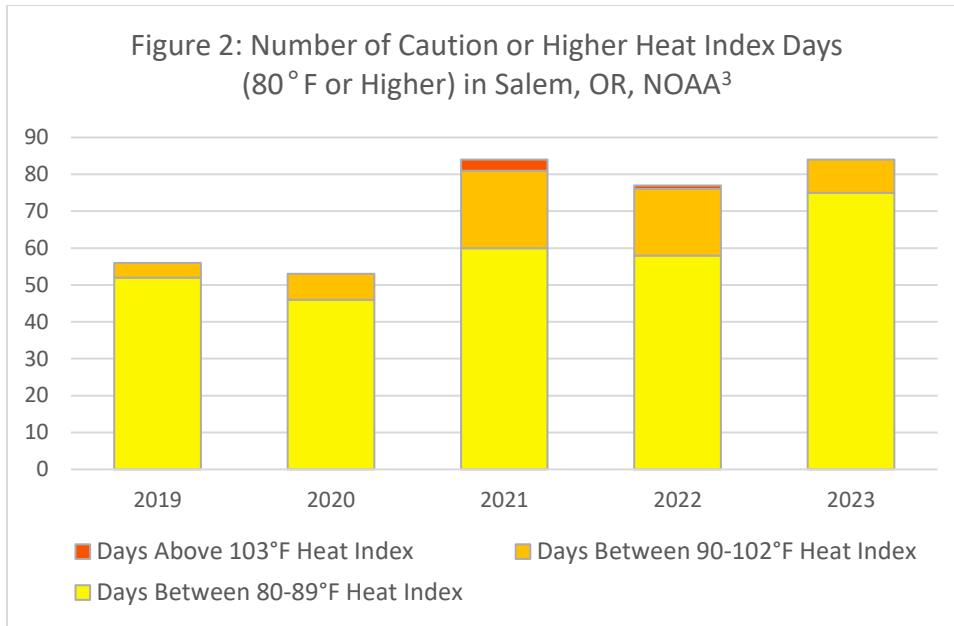


Figure 1. Heat index chart.

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity.
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity.
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.
Extreme Danger	125°F or higher	Heat stroke highly likely.



According to historical data from the National Weather Service, the heat index is a measure of how hot it feels in shady and light wind conditions when relative humidity is factored with air temperature (Figure 1). The higher the heat index, the higher the heat stress – causing poor health outcomes such as heat cramps, exhaustion, stroke, and potentially death. When the heat index reaches a threshold, the NWS will issue warnings for a local area. 2021 and 2023 had the most caution or higher heat index days (80°F heat index or higher) in the past five years (Figure 2). 2021 and 2022 had the most extreme caution heat index days (90°F or higher), and danger high heat days (103°F or higher) in the past five years (Figure 2 – 3). This difference puts more communities at greater risk of heat related illness when exposed for extended periods of time, especially in direct sunlight, which can increase the heat index values by 15°F. Results from subsequent figures and tables show heat related illnesses.<sup>5</sup>

## Emergency Department & Urgent Care Visits

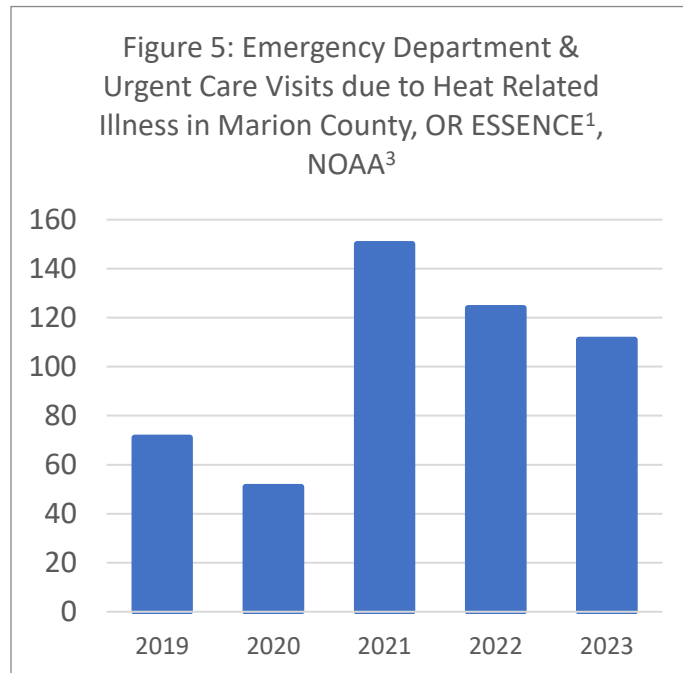
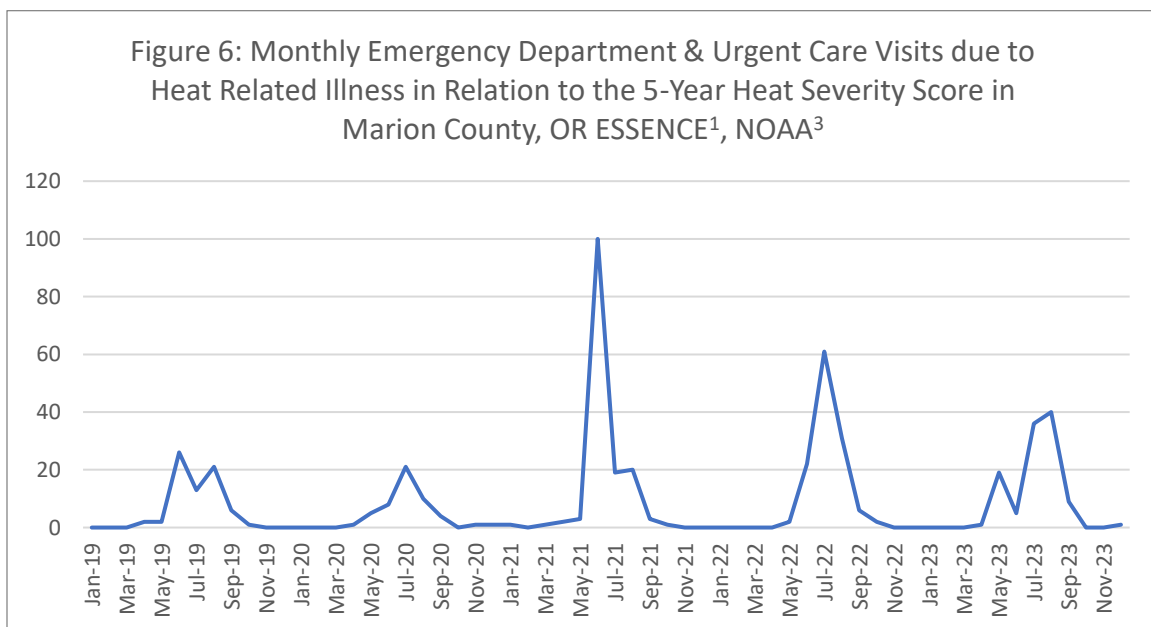


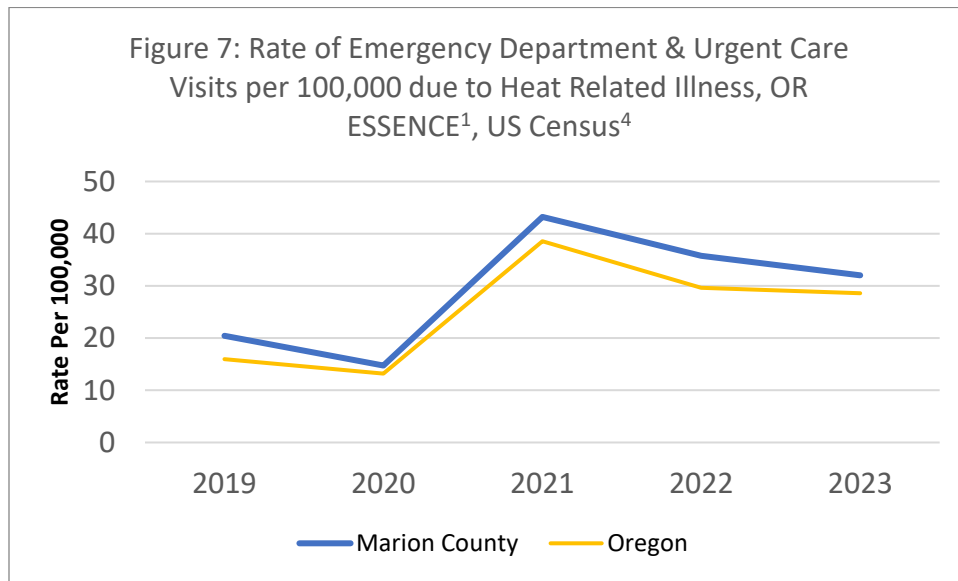
Table 1: Heat Related Illnesses (HRI) that occurred in each heat index classification, 2019-2023, ESSENCE<sup>1</sup>, NOAA<sup>3</sup>

Classification	HRI	Days	Cases / Day
Low	55	1471	0.03
Caution (80-89.9°F Heat Index)	205	291	0.7
Extreme Caution (90-102.9°F Heat Index)	174	59	2.9
Danger (103-124°F Heat Index)	73	4	18.25
<b>Total</b>	<b>507</b>	<b>1825</b>	



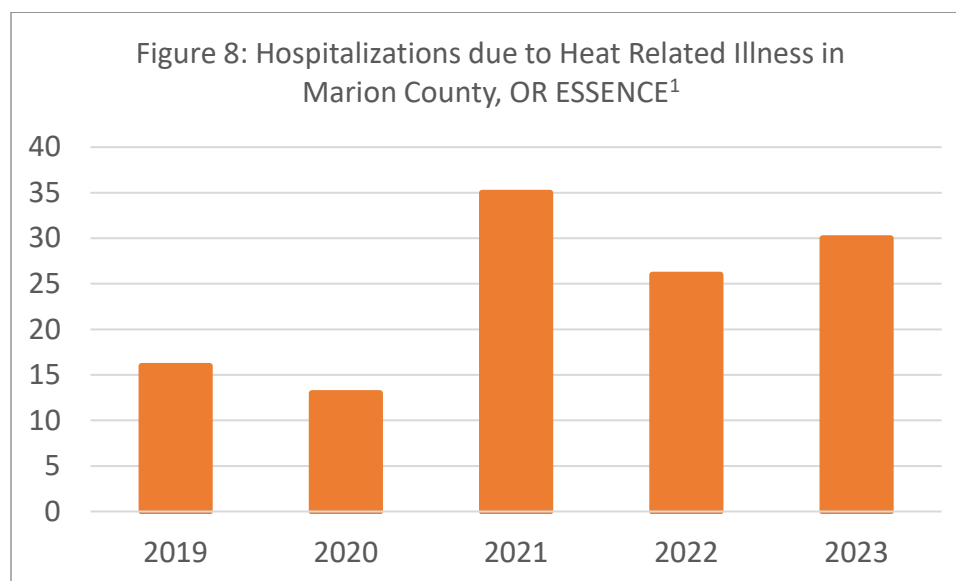
Trends in emergency department and urgent care visits for heat related illness (HRI) follow the expected heat index based on the severity over the 2019-2023 5-year period (Figure 5 and Figure 6). As the severity of the heat index increases from caution to danger (Table 1), so does emergency department and urgent care visits. Larger numbers in heat related illness visits spike following dangerous heat index days of 103°F or higher (Figure 4). In June 2021, Marion County experienced a historic heat dome, causing three consecutive days of a 103°F or higher heat index danger classification (Salem Heat Index: 106.9°F on June 26, 114.3°F on June 27, and

114.3°F on June 28). Over the night of June 26-27, 2021, only three hours were below the heat index caution of 80°F, leaving little respite from heat for the body to recover naturally. This resulted in 100 total emergency department and urgent care visits in June 2021 alone, nearly 1/5 of all visits between 2019-2023. Between 2021-23, Marion County residents visited an emergency department or urgent care facility on average 2.1 times as often for heat related illness than the combined average years of 2019-20. In total, 507 visits occurred between 2019 and 2023 for heat related illness in Marion County residents (average visits per year = 101.4).



An increasing trend in the rate of patient visits to emergency departments and urgent care facilities for heat related illness occurred between 2019 to 2023 for Marion County and Oregon residents (Figure 7). Marion County residents had a higher average rate of patient visits compared to Oregon residents during this period (28.5 per 100,000 for Marion County Vs. 24.3 per 100,000 for Oregon).

## Hospitalizations



Trends in heat related hospitalizations (spending 24 or more hours at the hospital) also increased in recent years (Figure 8). Compared to emergency department and urgent care visits, hospitalization statistics show more severe heat related health impacts. Between 2021-23, Marion County residents were hospitalized on average 2.1 times as often for heat related illness than the combined years of 2019-20. Even though 2023 never had a day that reached the danger classification, 2023 saw a higher rate of heat related hospitalizations than the five-year average for low, caution, and extreme caution categories. This trend shows that heat related hospitalizations were worse than the previous four years given the heat index severity. Between 2019-2023, 23.7% of Marion County residents who visited an emergency department or urgent care facility for a heat related illness were hospitalized.

## Deaths

Table 1. Natural heat deaths that occurred in Marion County and Oregon, 2019-2022, Oregon Health Authority Center for Health Statistics<sup>2</sup>

Year	Marion County		Oregon	
	Count	Rate per 100,000	Count	Rate per 100,000
2019	0	0	3	0.1
2020	0	0	1	0.02
2021	9	2.6	124	2.9
2022	2	0.5	14	0.3
<b>Total</b>	<b>11</b>	<b>0.8</b>	<b>142</b>	<b>0.8</b>

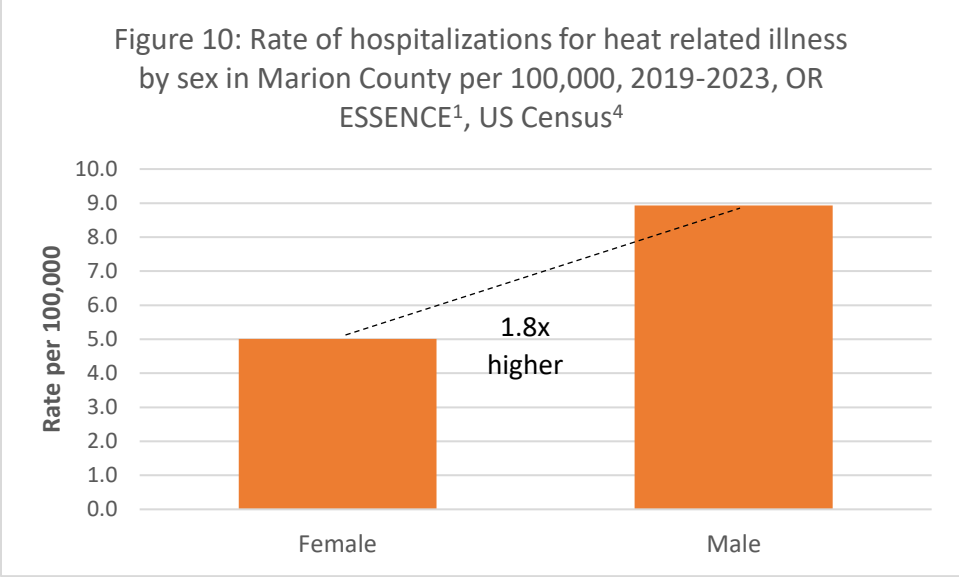
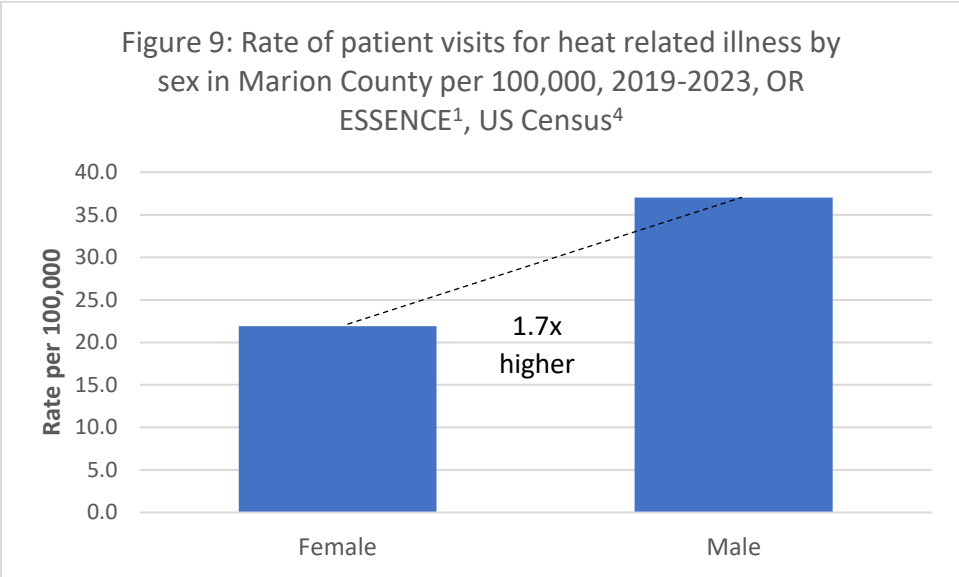
Between 2019-2022, Marion County totaled 11 deaths due to natural heat and Oregon totaled 142 (Table 1), both having a rate of 0.8 deaths per 100,000. Count and rate spikes in 2021 can

largely be attributed to a historic heat dome affecting the Pacific Northwest between June 26 – June 28, 2021. In Salem, high heat index temperatures experienced included 106.9°F on June 26, 114.3°F on June 27, and 114.3°F on June 28. This historic spike in heat early in the summer season attributed to an abnormally high rate of heat related mortality. As of the release of this report, data was unavailable for 2023.



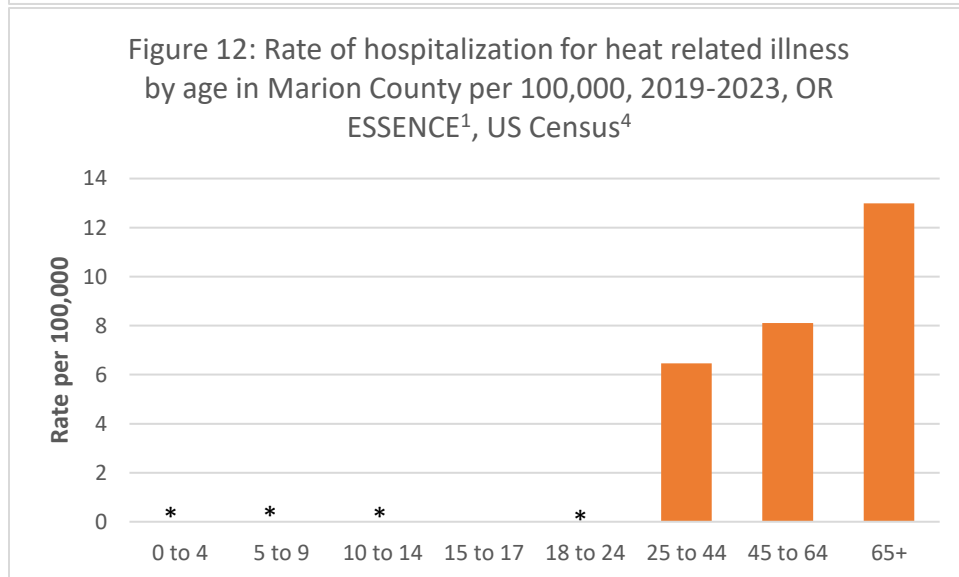
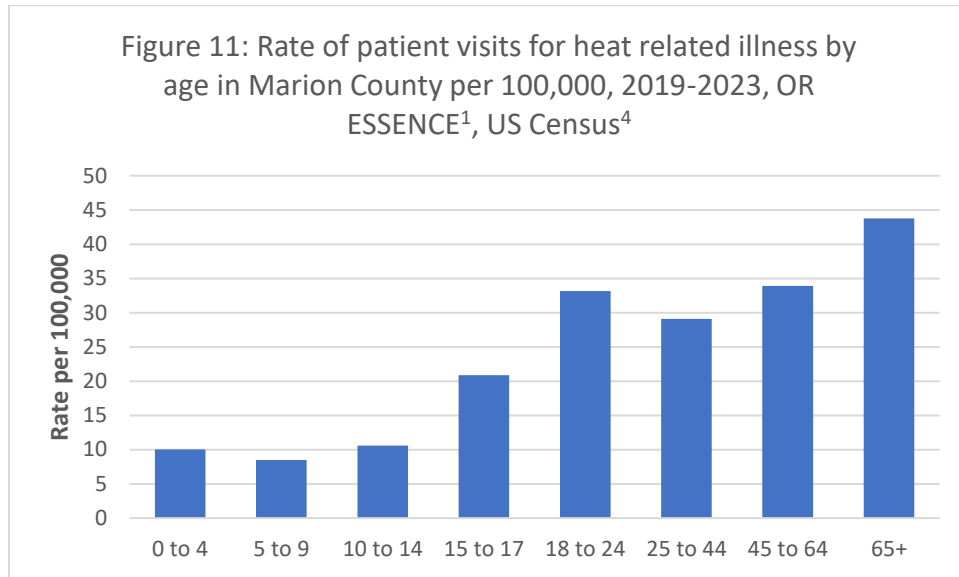
# Demographics

## Sex



Between 2019-2023, male residents in Marion County visited emergency department and urgent care facilities for heat related illness 1.7 times as often than female residents (Figure 9: 37.0 per 100,000 for males Vs. 21.9 per 100,000 for females). Males were hospitalized for heat related illness 1.8 times as often than females (Figure 10: 8.9 per 100,000 for males Vs. 5.0 per 100,000 for females). Between 2019-2023, 24.1% of males and 22.9% of females who visited an emergency department or urgent care facility for a heat related illness were hospitalized.

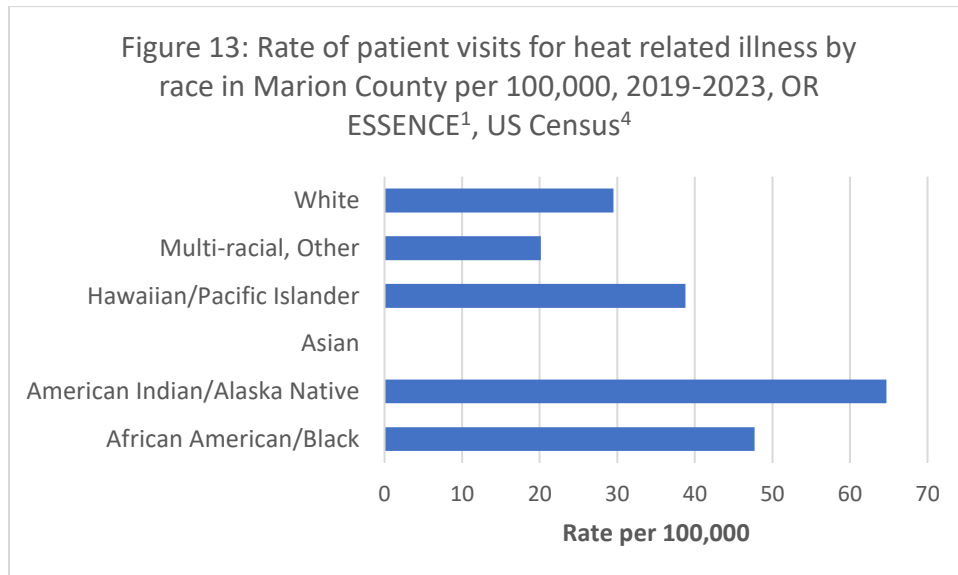
## Age



\*- Suppressed due to low counts (less than 6)

Between 2019-2023, the rate of patient visits to an emergency department or urgent care facility for heat related illness increased with age for Marion County residents (Figure 11). Older adults (age 65 or older) recorded the highest rate at 43.8 per 100,000. This disparity widened with age for hospitalizations (Figure 12). Older adults (age 65 or older) had a hospitalization rate of 13.0 per 100,000, which was 2.0 times that of the 24-44 age group at 6.5 per 100,000. Between 2019-2023, 29.7% of older adults (age 65 or older) who visited an emergency department or urgent care facility for a heat related illness were hospitalized. These trends can be attributed to the body's decreasing ability to regulate internal temperature as age increases and potentially other environmental, social, and economic factors affecting an individual's ability to stay cool.

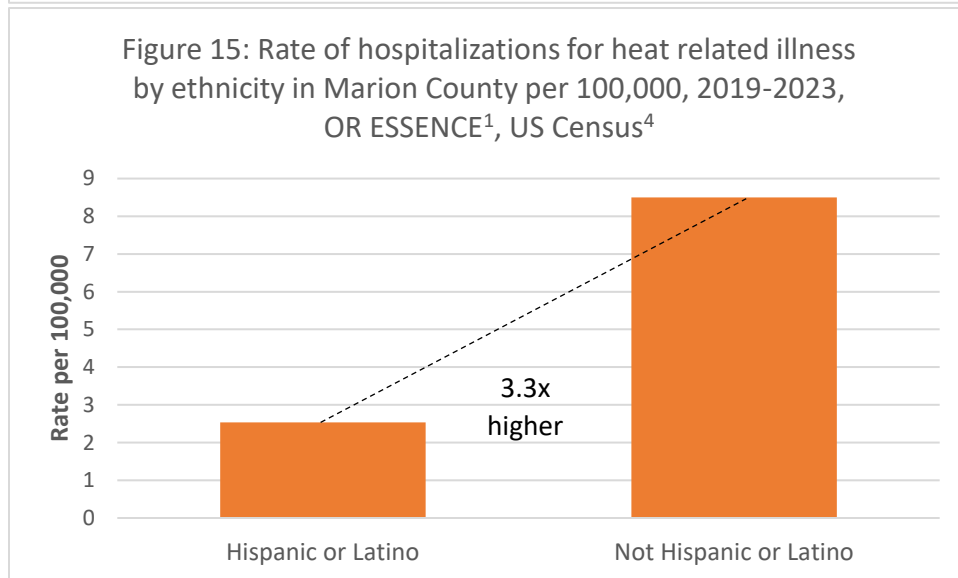
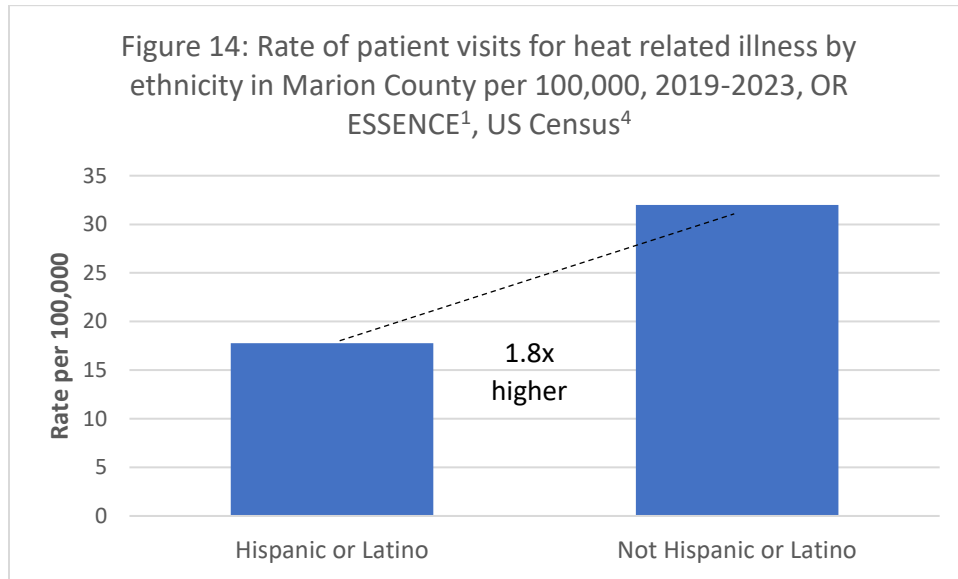
## Race



*\*- Suppressed due to low counts (less than 6)*

Marion County residents who identified as American Indian/Alaska Native had a significantly higher rate of visits to emergency departments or urgent care for heat related illness than their peers (64.7 per 100,000), followed by African American/Black (47.7 per 100,000) and Hawaiian/Pacific Islander (38.8 per 100,000) (Figure 13).

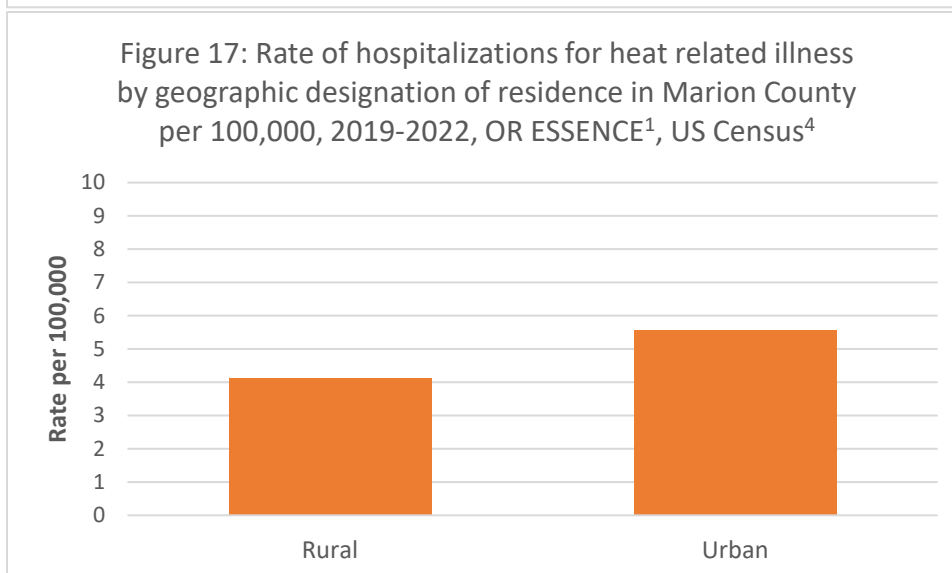
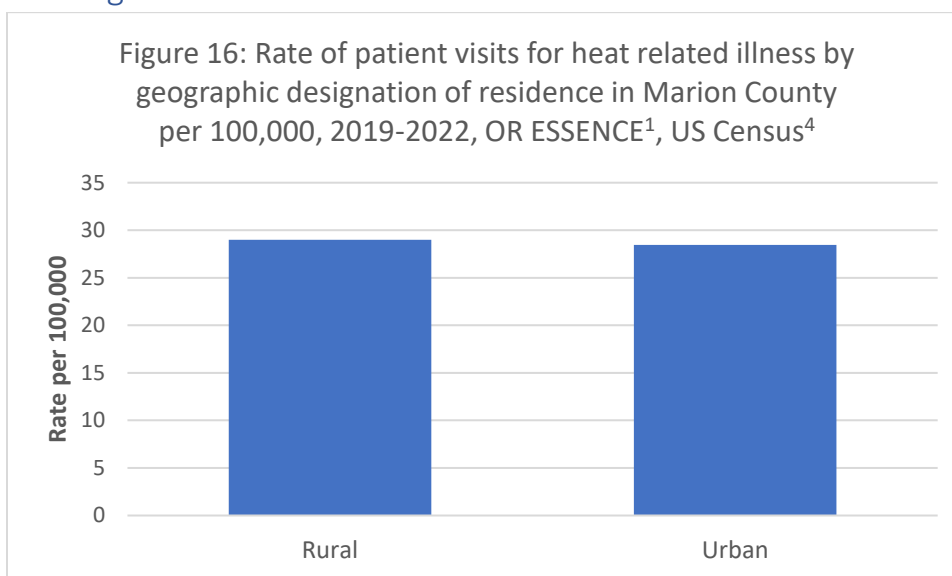
## Ethnicity



*\*Ethnicity as it is defined in OR ESSENCE system*

Between 2019-2023, Marion County residents who identified as 'Not Hispanic or Latino' had a higher rate of visits to emergency departments or urgent care for heat related illness than residents who identified as 'Hispanic or Latino' (Figure 14: 32.0 per 100,000 for not Hispanic or Latino Vs. 17.8 per 100,000 for Hispanic or Latino). This trend increased with hospitalizations (Figure 15). Between 2019-2023, individuals who identified as not Hispanic or Latino had a hospitalization rate 3.3 times than that of individuals who identified as Hispanic or Latino (8.5 per 100,000 for not Hispanic or Latino Vs. 2.5 per 100,000 for Hispanic or Latino).

## Geographic Designation – Rural & Urban Communities



*Rural = Any geographic area that is ten or more miles from the centroid of a population center of 40,000 or more*

Between 2019-2023, Marion County residents living in geographic areas with a rural designation had slightly higher rates of emergency department and urgent care visits for heat related illness than areas with an urban designation (Figure 15: 29.0 per 100,000 rural vs 28.5 per 100,000 urban). This trend switched with hospitalizations, where geographic areas with an urban designation had higher rates of hospitalizations from heat related illness than areas with a rural designation (Figure 16: 4.1 per 100,000 rural vs 5.6 per 100,000 urban). This trend indicates urban areas may have more heat sensitivity (vulnerable people) and heat exposure (such as urban heat islands, high impervious surfaces, lower tree canopy, etc.) than rural areas, causing greater sensitivity and hospitalizations to heat.

## Zip Code

Figure 18: Rate of patients visits in Marion County residents for heat related illness by zip code per 100,000, 2019-2023, OR ESSENCE<sup>1</sup>, US Census<sup>4</sup>

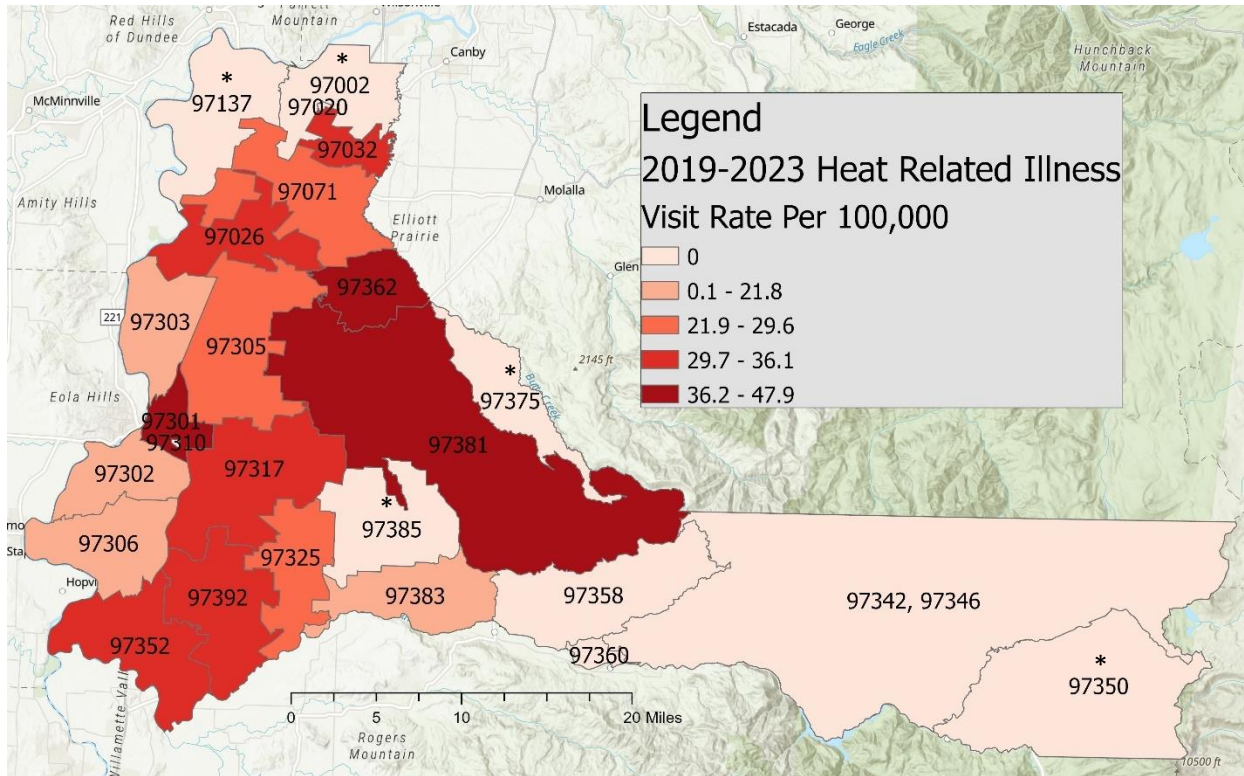


Table 2. Marion County Zip Code rates for patient visits to urgent care or emergency departments for heat related illness per 100,000 population, 2019-2023, OR ESSENCE<sup>1</sup>, US Census<sup>4</sup>

Zip Code	Name	Count of Visits	Population‡	Rate per 100,000
97002	Aurora	*	6,558	*
97020	Donald	0	1,200	0
97026	Gervais	6	3,620	33.1
97032	Hubbard	9	4,991	36.1
97071	Woodburn	41	31,345	26.2
97137	St Paul	*	1,157	*
97301	Central Salem	117	56,636	41.3
97302	South Salem	45	41,371	21.8
97303	Keizer	43	41,101	20.9
97305	NE Salem	65	43,869	29.6
97306	South Salem, Sunnyside	33	33,481	19.7
97317	SE Salem	41	25,635	32
97325	Aumsville	10	6,884	29.1

97342	Detroit	0	78	0
97346	Gates	0	933	0
97350	Idanha	*	200	*
97352	Jefferson	11	6,740	32.6
97358	Lyons	0		0
97360	Mill City	0		0
97362	Mt. Angel	10	4,174	47.9
97375	Scotts Mills	*	1,339	*
97381	Silverton	34	16,217	41.9
97383	Stayton	10	9,977	20
97384	Mehama	0	80	0
97385	Sublimity	*	3,487	*
97392	Turner	9	5,753	31.8
Other	Other	10	NA	NA
<b>All</b>	<b>Total</b>	<b>507</b>	<b>348,211</b>	<b>28.6</b>

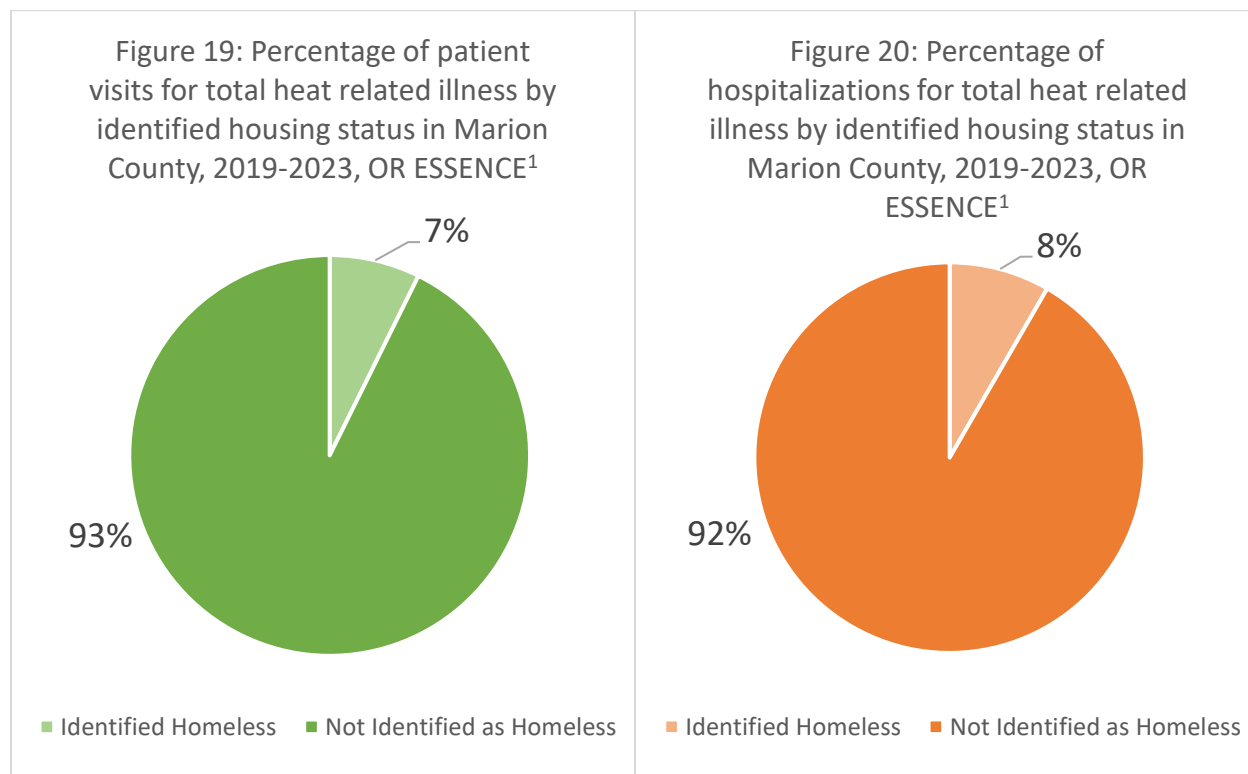
\* - Suppressed due to low counts (less than 6); Zip codes with no heat related illness between 2019-2023 appear without “\*”

NA – not available

‡ - American Community Survey (US Census) population estimate 2017-2021

Between 2019-2023, the rate of visits for heat related illness differed by geographical area of residence. Residents living in zip code 97362 had the highest rate of visits for heat related illness (Mt. Angel area at 47.9 per 100,000) followed by 97381 (Silverton area at 41.9 per 100,000) and 97301 (central Salem area at 41.3 per 100,000). The zip codes 97032 (Hubbard), 97352 (Jefferson), 97026 (Gervais), and 97392 (Turner) also had higher rates of visits for heat related illness than most zip codes.

## Identified Homeless & Unsheltered Persons



*Homelessness data acquired from Oregon ESSENCE is limited to if a provider identifies an individual or an individual self-identifies as homeless, houseless, unsheltered, or unhoused and it was notated in the patient chart.*

Between 2019-2023, 7% (37 people) of all heat related illness urgent care and emergency department visits in Marion County were identified as homeless (Figure 18), and 8% (10 people) of all hospitalizations in Marion County were identified homeless (Figure 19). This shows a slight increase in the proportion of people identified as homeless and hospitalized. While homeless counts occur each year, the total number of persons homeless is not accurate enough to provide rates to compare to other demographics. Overall, the number of homeless individuals experiencing heat related illness was likely undercounted, as a homeless designation for patients may not be standardized for individual emergency departments and urgent care clinics.



## Summary

In recent years, Marion County has seen an increase in the number of heat index caution days (80°F-89.9°F or higher), extreme caution days (90°F-102.9°F), and danger days (103°F-124.9°F). Subsequently, Marion County has also seen an increase in heat related illness emergency visits (emergency department and urgent care visits), severe heat related illness (in the hospital for 24 hours or longer), and heat related death.

Heat related illness does not affect all people and communities the same. The data shows that some people and communities experience heat related illness more and are therefore more vulnerable to heat than others. Males had higher rates of emergency visits and hospitalizations than females. Emergency visits and hospitalizations increased with age, peaking at 65 years old or older. Residents who identified as American Indian/Alaska Native had the highest rates of emergency visits, followed by residents who identify as African American/Black and Hawaiian/Pacific Islander. Residents who did not identify as Hispanic or Latino had higher rates of emergency visits and significantly higher rates of hospitalization than residents of Hispanic or Latino identity. 7% of all resident emergency visits were identified as homeless.

Geographically, rural geographies had slightly higher rates of heat related illness than urban geographies. When accounting for severity of illness, urban residents then had higher rates of hospitalizations. This trend indicates urban areas may have more heat sensitivity (vulnerable people) and heat exposure (such as urban heat islands, high impervious surfaces, lower tree canopy, etc.) than rural areas. Zip codes with the highest heat related illness emergency visit rate include Mt. Angel (97362), Silverton (97381), and Central Salem (97301).

This report and its associated indicators provide timely information that can detect trends and groups disproportionately affected by heat related illness for targeted interventions. Like any source, ESSENCE has key limitations, including the requirement that a person must be seen at an urgent care or emergency department to be detected in the ESSENCE surveillance system. Patients seen in other settings, such as a clinic, would be missed. Other limitations include errors in medical coding, or incomplete notes, which may influence results.

ESSENCE remains amongst the timeliest surveillance system for tracking resident patient visits for heat related illness in our community. Like any system, it is most effective when used in concert with other systems and indicators that describe heat related illness and its contributing risk factors.

## References

- <sup>1</sup> Oregon Health Authority. ESSENCE. Heat Related Illness. 2019-2023. <https://www.oregon.gov/oha/ph/diseasesconditions/communicabledisease/preparednesssurveillanceepidemiology/essence/pages/index.aspx>. Viewed 1/4/24.
- <sup>2</sup> Oregon Health Authority. Heat and cold exposure mortality rates, Center for Health Statistics. 2017-2021. Viewed 1/8/24.
- <sup>3</sup> National Oceanic and Atmospheric Administration. Local Climatological Data for Marion County, OR – Salem Airport McNary Field, OR US. 2019-2023. <https://www.ncei.noaa.gov/cdo-web/datatools/lcd>. Viewed 12/28/23.
- <sup>4</sup> United States Census Bureau. American Community Survey. 2017-2021. <https://data.census.gov/>. Viewed 10/11/23.
- <sup>5</sup> National Weather Service. Heat Forecast Tools. <https://www.weather.gov/safety/heat-index>. Viewed 1/8/24.

This report was originally released on 3/13/24, updated on 4/4/24.